PB89-196679

Superfund Record of Decision (EPA Region 9): Lorentz Barrel and Drum, San Jose, California (First Remedial Action), September 1988

(U.S.) Environmental Protection Agency, Washington, DC

25 Sep 88

U.S. Department of Commerce
National Technical Information Service
NTIS

PB89-196679

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R09-88/023
February 1988

EPA

Superfund Record of Decision:

Lorentz Barrel & Drum, CA

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Lorentz Barrel & Drum, CA
First Remedial Action

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U.S. Environmental Protection Agency
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Washington, D.C. 20460

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800/000

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 5.4-acre Lorentz Barrel & Drum (LB&D) site is located in San Jose, California, about 0.25 mile from San Jose State University. The site lies directly above a major source of potable ground water in the south San Francisco Bay area, with three public water supply well fields within one mile of the site. In 1947 the Lorentz family began a drum recycling operation on 10.5 acres of land at the site. Currently, 4.5 acres are capped with tar and gravel but contains stored drums, 0.75 acre includes the reconditioning facilities. Drums containing residual aqueous wastes, organic solvents, acids, oxidizers, caustic residues and oils were received for recycling. During the early years of operation, portions of the site were also leased to other companies. Between 1950 and 1978 a drainage ditch north of the drum processing building carried process wastes to a large sump and other ponding areas onsite. Prior to 1968 wastes from the sump were discharged to a storm drain system. Sometime between 1968 and 1971 the discharge was diverted to a sanitary sewer, and investigations indicate that this discharge occurred until 1984. After this time, liquid wastes were evaporated, drummed and disposed of as hazardous waste along with incinerator ash, residual liquids, and sludge. Subsequent surface runoff was collected and recycled in the hot caustic drum wash. Since 1981 several investigations have revealed soil and ground water
(See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision
Lorentz Barrel & Drum, CA
First Remedial Action
Contaminated Media: gw, soil
Key Contaminants: metals (arsenic, nickel), organics (PCBs, pesticides), VOCs (benzene, PCE, TCE)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

Availability Statement	**19. Security Class (This Report)** None	**21. No. of Pages** 119
	20. Security Class (This Page) None	**22. Price**

(See ANSI-Z39.18) *See Instructions on Reverse* **OPTIONAL FORM 272** (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R09-88/023
orentz Barrel & Drum, CA
First Remedial Action

16. ABSTRACT (continued)

contaminated with numerous metals, organics, and PCBs. Removal of drums, stored hazardous materials, and highly contaminated soil has been conducted at the site. This remedial action will address the offsite contaminated shallow ground water. Onsite contaminated soil and additional shallow and deep ground water remediation will be addressed in a subsequent remedial action. The primary contaminants of concern affecting soil and ground water are VOCs, including benzene, PCE and TCE, other organics including PCBs and pesticides, and metals including arsenic and nickel.

The selected Expedited Response Action for this site includes: onsite ground water pump and treatment using ozone/UV for organic removal and ion exchange for nickel removal, with discharge of treated water to a local creek. The estimated present worth cost for this remedy is $3,238,000 with annual O&M costs of $198,000.

LORENTZ BARREL & DRUM
ENGINEERING EVALUATION/COST ANALYSIS
RECORD OF DECISION

PART 1 - DECLARATION

PART 2 - DECISION SUMMARY

PART 3 - RESPONSIVENESS SUMMARY

LORENTZ BARREL & DRUM
ENGINEERING EVALUATION/COST ANALYSIS
RECORD OF DECISION

PART 1
DECLARATION

RECORD OF DECISION
DECLARATION

Statutory Preference for treatment as a principal element is met.

SITE NAME AND LOCATION

Lorentz Barrel & Drum
San Jose, California

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Expedited Response Action (ERA)/Operable Unit for the Lorentz Barrel & Drum (LB&D) site in San Jose, California. This remedial action was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by Superfund Amendment and Reauthorization Act of 1986 (SARA), and the National Contingency Plan. The ERA/Operable Unit is the result of the Engineering Evaluation/Cost Analysis (EE/CA). Final remedial actions are being studied as part of the ongoing Remedial Investigation/Feasibility Study (RI/FS). The attached index identifies the items which comprise the administrative record upon which this Record of Decision (ROD) is based.

The State of California concurs with the selected remedy.

DESCRIPTION OF THE REMEDY

This ERA/Operable Unit is the second action of three operable units for the site. The first action was the removal of drums, stored hazardous materials, and severely contaminated soils. This document addresses an ERA/Operable Unit for treatment of the offsite contaminated shallow groundwater. Both the shallow and deep groundwater and onsite contaminated soils are being studied in further detail during the ongoing RI/FS.

The remedy selected herein addresses the principal near-term threats in the site vicinity. Threat of contamination of the deep drinking water aquifer and nearby surface water bodies will be addressed by extracting the contaminated shallow groundwater and treating it to action levels prescribed by Applicable or Relevant and Appropriate Requirements (ARARs).

The major components of the shallow groundwater remedy include:

- o construction and operation of a groundwater extraction system to intercept several shallow groundwater plumes;

- construction and operation of a groundwater treatment system; and
- disposal of treated groundwater to the storm sewer, from which it flows to Coyote Creek.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and state requirements that are applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy satisfies the statutory preference for remedies that reduce toxicity, mobility, and/or volume as a principal element. It also utilizes permanent solutions to the maximum extent practicable. The applicability of the 5-year facility review provision will be determined after the RI/FS is completed.

9.21.88 John Wise

Date Signature (DRA)

9.25.88 Daniel W. McGovern

Signature (AA/RA)

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Superfund Program

Mary Masters
Mary Masters
Remedial Project Manager
South Bay Section (T-4-5)

9/14/88
Date

Mary Masters for Amy Zimpfer
Amy Zimpfer
Chief
South Bay Section (T-4-5)

9/14/88
Date

Phil Bobel
Chief
Superfund Remedial Branch (T-4-A)

9/14/88
Date

Jerry Clifford
Jerry Clifford
Assistant Director for Superfund
Toxics and Waste Management Division (T-4)

9/22/88
Date

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Toxics and Management Division

Laura K. Yoshii for
Jeff Zelikson
Director
Toxics and Waste Management Division

9.14.88
Date

0000231

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Water Management Division

Keith Takata
Harry Seraydarian
for Director
Water Management Division

9-13-88
Date

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Office of Policy and Management

Nora M. Gee

Nora McGee
Director
Office of Policy and Management

9-19-88
Date

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Office of Regional Counsel

Nancy J. Marvel

Nancy Marvel
Regional Counsel
Office of Regional Counsel

Sept 20, 1988
Date

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Air Management Division

for Dave Howekamp
Director
Air Management Division (A-1)

9/21/88
Date

LORENTZ BARREL & DRUM
ENGINEERING EVALUATION/COST ANALYSIS
RECORD OF DECISION

PART 2
DECISION SUMMARY

LORENTZ BARREL & DRUM
ENGINEERING EVALUATION/COST ANALYSIS RECORD OF DECISION
DECISION SUMMARY

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1.0 SITE LOCATION AND DESCRIPTION

The Lorentz Barrel & Drum (LB&D) site is located at 1515 South Tenth Street, on the southwest corner of the intersection of East Alma Avenue and South Tenth Street in the southern portion of the City of San Jose, Santa Clara County, California (Figure 1-1). A land use map of the site and vicinity is shown in Figure 1-2.

The residential district to the north and east of the LB&D site includes Spartan Field (San Jose State University football stadium), San Jose Bees Stadium (City of San Jose), and San Jose State University recreation fields. The closest housing to the site consists of San Jose State University student housing, roughly 1/4 mile north of the site.

Topography of the site is nearly level, with a slight slope from the southwest corner to the northeast corner. The highest elevation at the southwest corner is 106 feet and the lowest point at the northeast corner is 102 feet above sea level.

The site is located in the southeastern corner of the San Jose subarea as defined by The California Department of Water Resources (DWR, 1967). This subarea is one of the most important natural source of groundwater in the south San Francisco Bay area ("south bay"). The deep aquifer (250 to 400 feet below ground surface) is a major source of potable groundwater, from which it is estimated that Santa Clara Valley extracts 107,000 acre-feet per year. Three public water supply well fields (owned by San Jose Water Company), located at the 12th Street, Cottage Grove, and Needles Stations, are within 1 mile of the site. A San Jose State University well is located at the Spartan Stadium.

The major surface water stream in the vicinity is Coyote Creek. It is less than 1/2 mile from the site, toward the northeast. Coyote Creek perennial flows are regulated by Coyote and Anderson reservoirs, which are controlled by the Santa Clara Valley Water District.

At the time drum processing operations started in 1947, the site included 10 1/2 acres of land. The current site is L-shaped and covers 5 1/4 acres of which approximately 4 1/2 acres are capped with tar and gravel. The area that is now sealed was used for drum storage and covers sections of soil which were discolored and possibly contaminated.

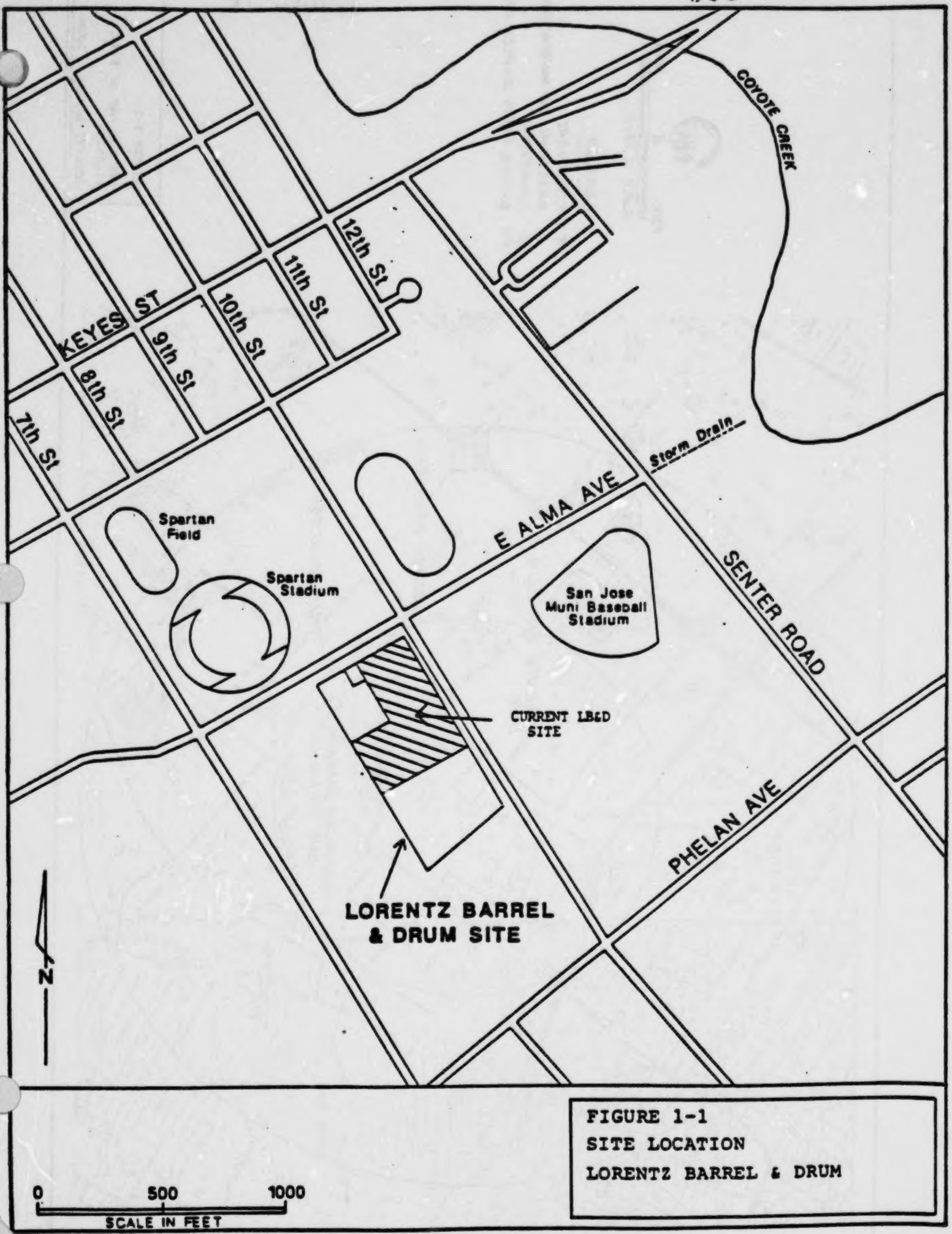

COYOTE CREEK
12th St
11th St
10th St
9th St
8th St
7th St
KEYES ST
Storm Drain
E ALMA AVE
Spartan Field
Spartan Stadium
San Jose Muni Baseball Stadium
SENTER ROAD
CURRENT LB&D SITE
PHELAN AVE
LORENTZ BARREL & DRUM SITE
N
0
500
1000
SCALE IN FEET

FIGURE 1-1
SITE LOCATION
LORENTZ BARREL & DRUM

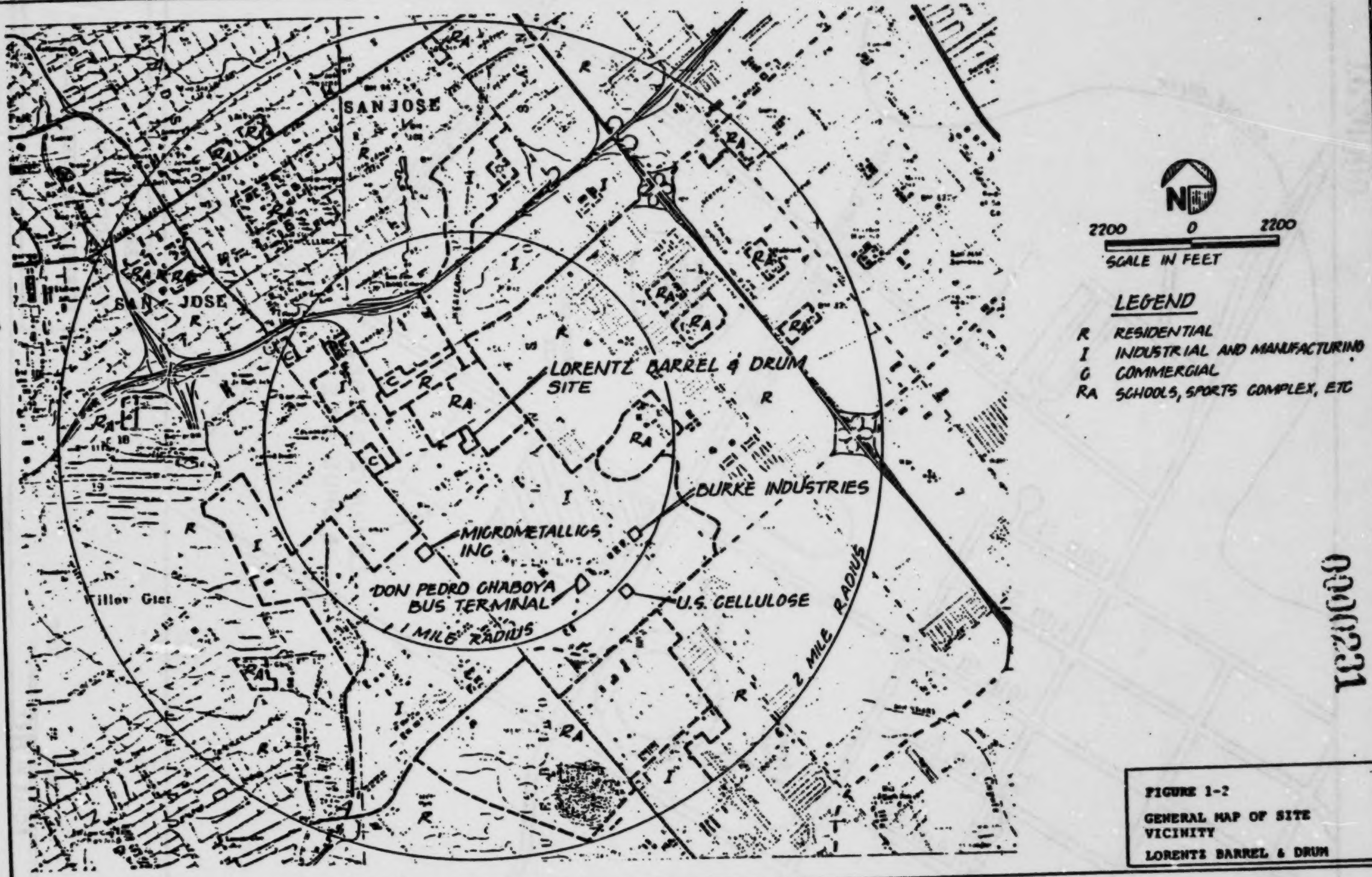
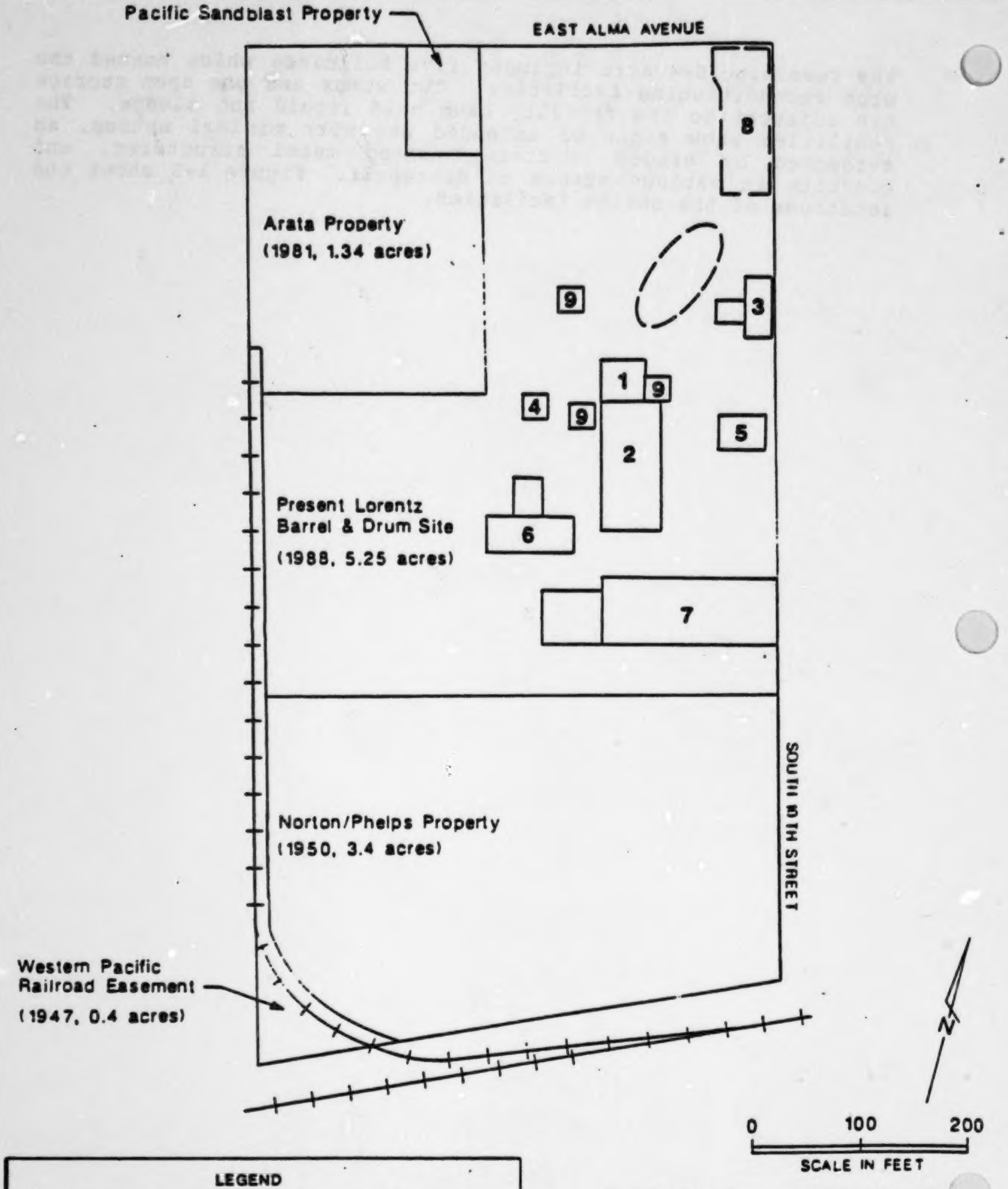

SAN JOSE
SAN JOSE
R
I
C
RA
LORENTZ BARREL & DRUM SITE
BURKE INDUSTRIES
MICROMETALLICS INC
DON PEDRO CHABOYA BUS TERMINAL
U.S. CELLULOSE
1 MILE RADIUS
2 MILE RADIUS
Willow Glen
2200
0
2200
SCALE IN FEET
LEGEND
R RESIDENTIAL
I INDUSTRIAL AND MANUFACTURING
C COMMERCIAL
RA SCHOOLS, SPORTS COMPLEX, ETC

FIGURE 1-2

GENERAL MAP OF SITE VICINITY

LORENTZ BARREL & DRUM

The remaining 3/4 acre includes five buildings which housed the drum reconditioning facilities. Two sumps and one open storage bin adjacent to the facility have held liquid and sludge. The facilities show signs of extended use with minimal upkeep, as evidenced by eroded concrete, rusted metal structures, and conduits in various stages of disrepair. Figure 1-3 shows the locations of the onsite facilities.


Pacific Sandblast Property
EAST ALMA AVENUE
Arata Property
(1981, 1.34 acres)
Present Lorentz Barrel & Drum Site
(1988, 5.25 acres)
Norton/Phelps Property
(1950, 3.4 acres)
SOUTH 10TH STREET
Western Pacific Railroad Easement
(1947, 0.4 acres)
1
2
3
4
5
6
7
8
9
N
0
100
200
SCALE IN FEET

LEGEND

1 Treatment Facility
2 Processing Facility
3 Former location of Lorentz residence
4 Incinerator
5 Shop and Bathrooms
6 Storage Facility
7 Warehouse and Office
8 Former Sump
9 Existing Sump
[ ] 1987 Excavations

FIGURE 1-3
SITE FACILITIES
LORENTZ BARREL & DRUM

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 HISTORY OF SITE ACTIVITIES

The Lorentz family started recycling drums at the site in 1947. During the early years, portions of the site were also rented or leased to other companies. Several facilities were in operation around 1954, including an autowrecker, a junkyard, a roofing company, a construction company, and sandblasting services.

Drums for recycling were received from both private and public sources throughout California and Nevada. Private sources included over 800 different companies, representing chemical, food, health care, electronics, paint, ink, and paper industries. Public sources included military bases, research laboratories, and county agencies. Drums arrived at the site containing residual aqueous wastes, organic solvents, acids, oxidizers, and oils. (Under current law, drums sent to a recycling facility can contain no more than 1 inch of residual material.) Lorentz Barrel & Drum (LB&D) also received polyethylene carboys or drums containing caustic residues.

From the 1950s until some time between 1976 and 1978, a drainage ditch (which probably drained processing waste) existed north of the processing structure (buildings 1 and 2 in Figure 1-3). The northeastern corner of the site had a large sump (30 feet by 80 feet) from the 1950s through the late 1970s. Aerial photographs of the area revealed the presence of liquids in the sump, drainage ditch, and various ponded areas during this period of time. The sump appeared to have been filled in with soil prior to 1980.

Research into San Jose City records has shown that prior to 1968, the waste stream from the drum recycling processes flowed from the processing structure, through the drainage ditch, to the large sump in the northeast corner of the site. It was then discharged to the storm drain system. Between 1968 and 1971 the discharge was diverted to the sanitary sewer. Previous investigations have indicated that discharge to the sanitary sewer ceased in 1983 or 1984. After 1984, liquid wastes were reportedly reduced in volume by evaporation, drummed and disposed of as hazardous waste along with incinerator ash, residual liquids, and sludge. Surface runoff was reportedly collected and recycled in the hot caustic wash cycle of the drum recycling process.

2.2 HISTORY OF SITE INVESTIGATIONS

Since 1981 there have been several environmental sampling studies at the LB&D site aimed at investigating the extent and nature of contamination. The California Department of Health

Services (DHS), their consultants and various consultants to LB&D have collected soil and groundwater samples from onsite and offsite monitoring wells. On six occasions, groundwater or soil samples were taken from the site. Numerous metals, organics, and polychlorinated biphenyls (PCBs) were found above Total Threshold Limit Concentrations (TTLC). Sampling results from these efforts are summarized in Section 5.0 of this Decision Summary.

2.3 HISTORY OF ENFORCEMENT ACTIONS

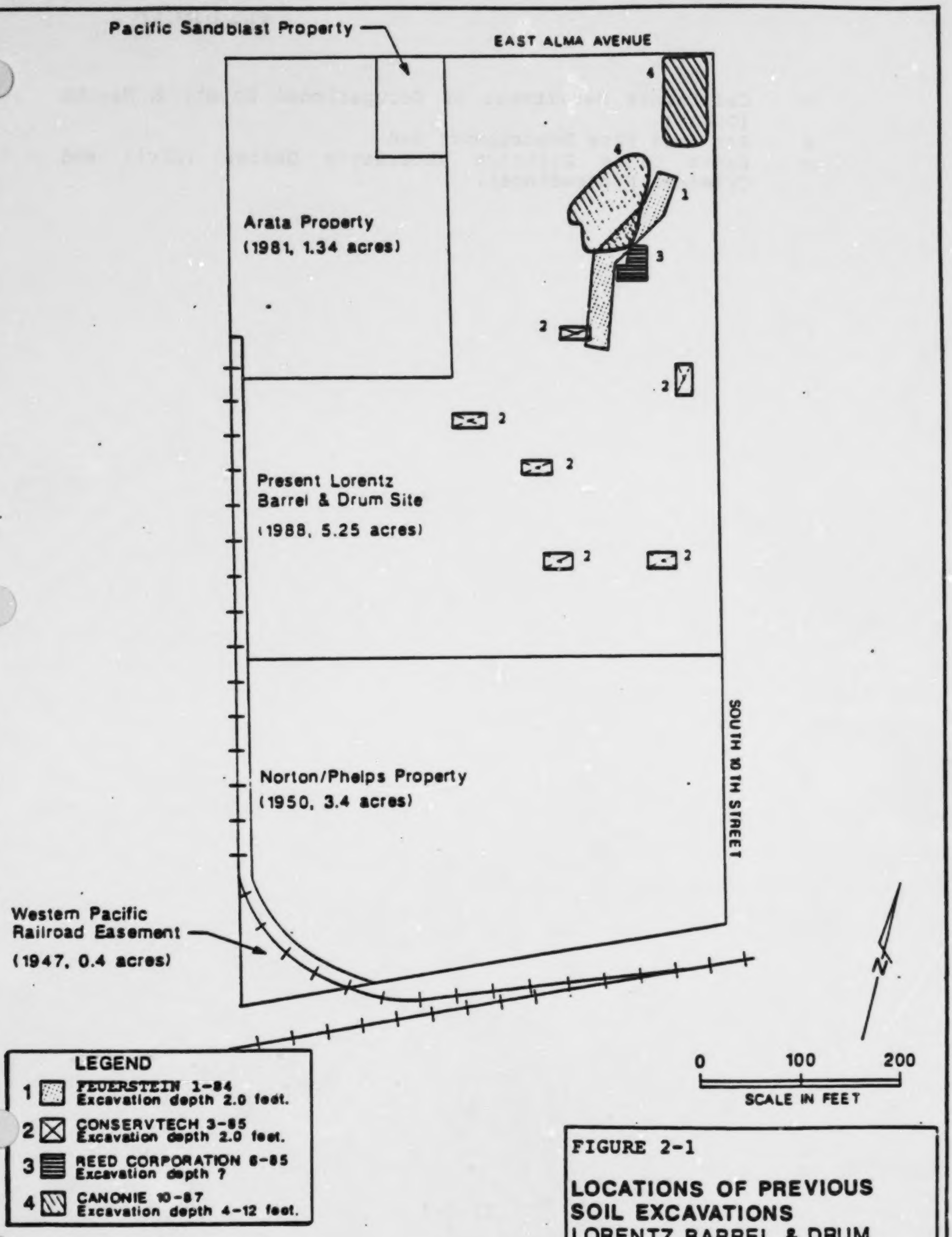
Since 1968, there have been many regulatory actions at the LB&D site. A complete chronological list of enforcement events is given in Appendix B of the Engineering Evaluation and Cost Analysis (EE/CA) (Ebasco, May 1988).

In summary, the major enforcement episodes have been:

- 1982 - The DHS investigated soil contamination, resulting in a Remedial Action Order in 1987.
- 1982 - The Regional Water Quality Control Board (RWQCB) investigated groundwater contamination, resulting in Clean Up & Abatement Order No. 86-001.
- 1984 - The United States Environmental Protection Agency (EPA) formally proposed LB&D as a candidate for the National Priority List.
- 1987 - The LB&D facility ceased operation due to a temporary restraining order from DHS. The EPA assumed the lead agency responsibility for the site remediation.
- Since 1984, several parties have excavated known "hot spots" of contaminated soil from the sump areas. These include three contractors hired by LB&D, as well as a DHS contractor (Canonie Environmental). Excavated areas are shown in Figure 2-1.
- In December 1987, EPA initiated an Expedited Response Action (ERA)/Operable Unit for the shallow groundwater plume extending northward from the site. The EE/CA recommended extraction of the groundwater, followed by treatment and disposal to the storm sewer.

Other agencies which have cited LB&D for some type of violation include:

- California Department of Fish & Game (CDFG);
- San Jose/Santa Clara Water Pollution Control Plant;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(1950, 3.4 acres)
SOUTH 10TH STREET
Western Pacific Railroad Easement
(1947, 0.4 acres)
1
2
3
4
N
0
100
200
SCALE IN FEET
LEGEND
1 FEUERSTEIN 1-84 Excavation depth 2.0 feet.
2 CONSERVTECH 3-85 Excavation depth 2.0 feet.
3 REED CORPORATION 6-85 Excavation depth ?
4 CANONIE 10-87 Excavation depth 4-12 feet.

FIGURE 2-1

LOCATIONS OF PREVIOUS SOIL EXCAVATIONS
LORENTZ BARREL & DRUM

- California Department of Occupational Safety & Health (OSHA);
- San Jose Fire Department; and
- Santa Clara District Attorney's Office (Civil and Criminal Proceedings).

3.0 COMMUNITY RELATIONS HISTORY

A history of the community relations activities at the Lorentz Barrel & Drum (LB&D) site, the background on community involvement and concerns, and specific comments and responses on the Engineering Evaluation and Cost Analysis (EE/CA) are summarized in the Responsiveness Summary (Part 3) of this Record of Decision (ROD).

4.0 SCOPE OF RESPONSE ACTION

4.1 OBJECTIVES OF RESPONSE ACTION

This Expedited Response Action (ERA)/Operable Unit will address the three principal hazards posed by the contaminated shallow aquifer. These hazards are: further migration of the plume; potential plume discharge into Coyote Creek; and potential contamination of the drinking water supply (deep aquifer). The United States Environmental Protection Agency (EPA) believes that the drinking water supply is potentially at risk, and action should not be delayed until the Remedial Investigation/Feasibility Study (RI/FS) process is completed.

4.1.1 Plume Migration

A groundwater extraction system is proposed in order to prevent existing contamination in the shallow aquifers from migrating deeper and farther from the site. The groundwater extraction system will consist of a series of linear well fields. Each row of extraction wells, pumped simultaneously, will create a trough in the water table beyond which groundwater should not flow. Final design of the extraction system will be based upon data obtained during the RI (which has already been initiated) concerning aquifer yield and water quality parameters which can affect system hydraulics (e.g., hardness) and effluent limitations (e.g., nickel).

4.1.2 Plume Discharge to Coyote Creek

Existing data suggest that portions of the shallow aquifer are hydraulically connected with (i.e., discharge to) Coyote Creek. As a result, contamination in the shallow aquifer may lead to Coyote Creek contamination, posing a threat to aquatic life and human populations (via fish or shellfish ingestion or dermal contact). The proposed extraction system will attempt to retard north and northeasterly migration of the plumes toward Coyote Creek, thus preempting such a threat.

4.1.3 Contamination of the Drinking Water Supply

The San Jose Water Company relies on water contained in the deep aquifer underlying the contaminated aquifer. Contamination of the deep aquifer could eventually occur as the result of discontinuities in the 50-foot aquitard, either natural or as created around abandoned private supply wells located within the plume areas (see Chapter 5.0 for a more detailed discussion of the area's groundwater regime). In June, five San Jose Water Company municipal wells were sampled. The analytical data are not yet available, but those wells will be sampled again during the RI, and results will be presented in RI report. To date, no contamination has been found in the San Jose Water Company municipal wells.

The proposed extraction and treatment system will remove contaminated water from the shallow aquifer and control continued lateral and/or vertical spreading of the plume. These actions will greatly reduce the possibility of contamination of potable water supplies.

4.2 RELEVANCE TO SITE REMEDIATION STRATEGY

The remedial actions taken to date have been aimed at reducing or stabilizing further infiltration of contaminants into the shallow aquifer. These actions have included removal of contaminated drums from the site, drainage of the existing storage tanks; removal of the heavily contaminated soil, particularly underneath the former northeast sumps; and (in early 1988) paving most of the site to preclude surface water infiltration from being a continued vector of contaminant transport into groundwater.

The proposed action will further EPA's interim remediation of the site by retarding contaminant migration in groundwater and removing and treating some of the water presently contaminated. This action is referred to as ERA/Operable Unit 1, and it is considered to be consistent with future action expected to be implemented to permanently remediate site conditions. While the ongoing RI/FS will include evaluation of potential source removal (i.e., contaminated soils) the problem is mainly one of groundwater contamination, a principal remedy of which is groundwater pumping and treatment. The remediation presented in this ROD is therefore relevant to and consistent with the overall site remediation strategy.

5.0 SITE CHARACTERISTICS

5.1 PREVIOUS INVESTIGATIONS

The Lorentz Barrel & Drum (LB&D) site has been the subject of numerous investigations. The following discussion of regional and site-specific hydrogeology has been adapted from a report entitled "Technical Memorandum: Preliminary Hydrogeologic Assessment" (CH2M Hill, November 1987a), as modified by observations and measurements made by Ebasco in a limited sampling program performed in June 1988 and bench scale treatability-related studies done in July/ August 1988.

5.1.1 Regional Hydrogeology of the Santa Clara Valley

The LB&D site lies near the center of the Santa Clara Valley between the Santa Cruz Mountains to the west and the Diablo Range to the east. The Santa Clara Valley is a broad alluvial basin trending northwesterly. The sediments are divided into the lower Plio-Pleistocene Santa Clara Formation, which is somewhat consolidated and has been deformed, and the upper Quaternary alluvium, which is poorly consolidated. Both units consist of interbedded gravel, sand, silt, and clay, and they cannot be reliably differentiated in well logs (CH2M Hill, February 1987).

The San Jose subarea, in which LB&D is located, is considered one of the most important parts of the South Bay Groundwater Basin due to the thickness and permeability of the water-bearing units. At least two major water-bearing units or aquifers are believed to exist in the LB&D area, separated by a marine clay layer or aquitard, formed during past incursions of San Francisco Bay. The upper water-bearing unit is a shallow aquifer zone that may be confined. Below this is an aquitard; below the aquitard and approximately 250 feet below the surface lies the stressed confined aquifer zone from which municipal wells are pumped. The lateral extent of this major aquitard is not fully known, but it seems to be present in the LB&D area.

5.1.2 Site-Specific Hydrogeology

Within the site, the sediments are primarily composed of fine-grained, unconsolidated silts and clays with interbedded sand and gravel lenses.

A generalized cross-section of the site-specific hydrogeology is shown in Figure 5-1. Based on the information available, a layer of clayey-silt underlies the site to a depth of about 5 feet. Beneath this is a layer of sand and gravel which ranges from 2 to 15 feet thick. Below the sand and gravel layer is a silty clay layer to about 70 feet below surface. This layer

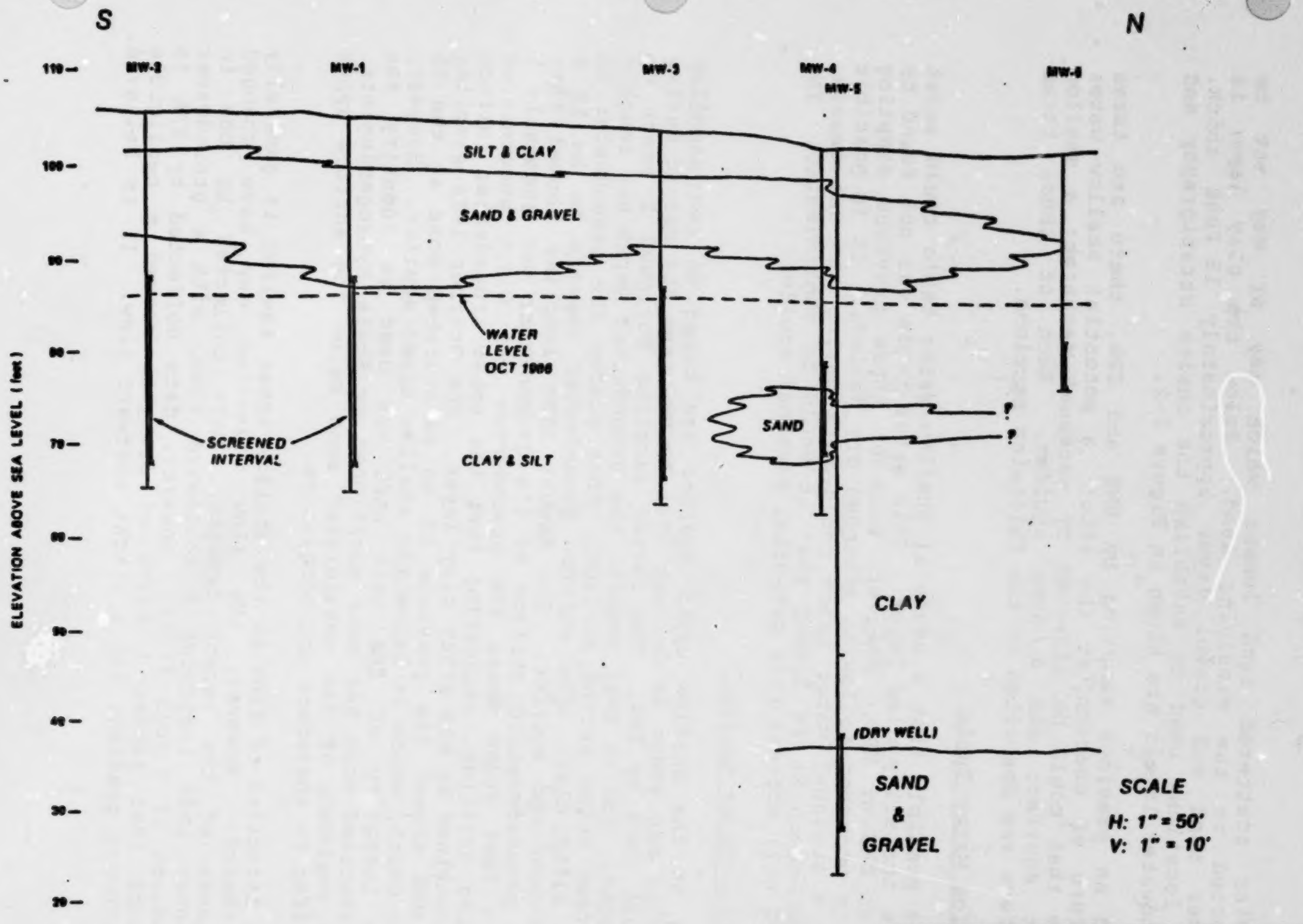

S
N
110
100
90
80
70
60
50
40
30
20
ELEVATION ABOVE SEA LEVEL (feet)
MW-2
MW-1
MW-3
MW-4
MW-5
MW-6
SILT & CLAY
SAND & GRAVEL
WATER LEVEL OCT 1986
SCREENED INTERVAL
CLAY & SILT
SAND
?
?
CLAY
(DRY WELL)
SAND & GRAVEL
SCALE
H: 1" = 50'
V: 1" = 10'

FIGURE 5-1
GENERAL GEOLOGIC CROSS-SECTION (adapted from CH2M Hill PSAR, February 1987)
LORENTZ BARREL & DRUM

contains scattered sand lenses which may or may not be connected to the overlying sand. Below the clay layer is another sand and gravel layer approximately 15 feet thick. Well locations used to establish the onsite stratigraphy and groundwater levels are shown in Figure 5-2.

Based on previous sampling by DHS and EPA, there are three aquifers of concern at the site: a potential shallow water table that could be affected by seasonal recharge; a shallow upper aquifer; and a deep aquifer. Each of these three aquifers are described in the following sections.

Shallow Water Table

It is possible that a seasonal shallow water table could exist above the silty clay layer. This water table was not found by either DHS or EPA. However, both of those previous sampling events occurred following extended dry periods. It is possible that a seasonal water table could form during the wet season. If so, then it is likely that it would be contaminated. The RI/FS will address this potential seasonal aquifer.

Shallow Upper Aquifer

Data on the shallow upper aquifer are based on two sampling events: one event in October 1986 by DHS; and the second during August 1988 by EPA. The latter sampling followed 2 years of drought. During both events, the groundwater depth was roughly 25 feet below ground surface. This places the groundwater in the silty clay. The shallow groundwater appears to be in a semi-confined aquifer. The August 1988 sampling showed that the potentiometric surface of the groundwater was generally 1 to 5 feet above where the groundwater was first encountered during drilling, indicating that the upper groundwater surface is confined by the silty clay layer. The October 1986 sampling by DHS showed the presence of an unsaturated zone at the 75 foot depth, which is below the shallow upper aquifer. However, the integrity of the well that was used to identify the unsaturated zone has been questioned by State hydrogeologists. The presence of the unsaturated zone below the shallow upper aquifer is therefore not conclusive.

The direction of flow in the shallow upper aquifer is generally northward. However, the flow direction may have changed because of the recent drought. Data collected by DHS in October 1986 indicated a northward flow, with a groundwater gradient of 0.0015 ft/ft. However, data collected by EPA in August 1988 (after 2 years of drought) showed a negligible northward gradient and a slight eastward flow. It is believed

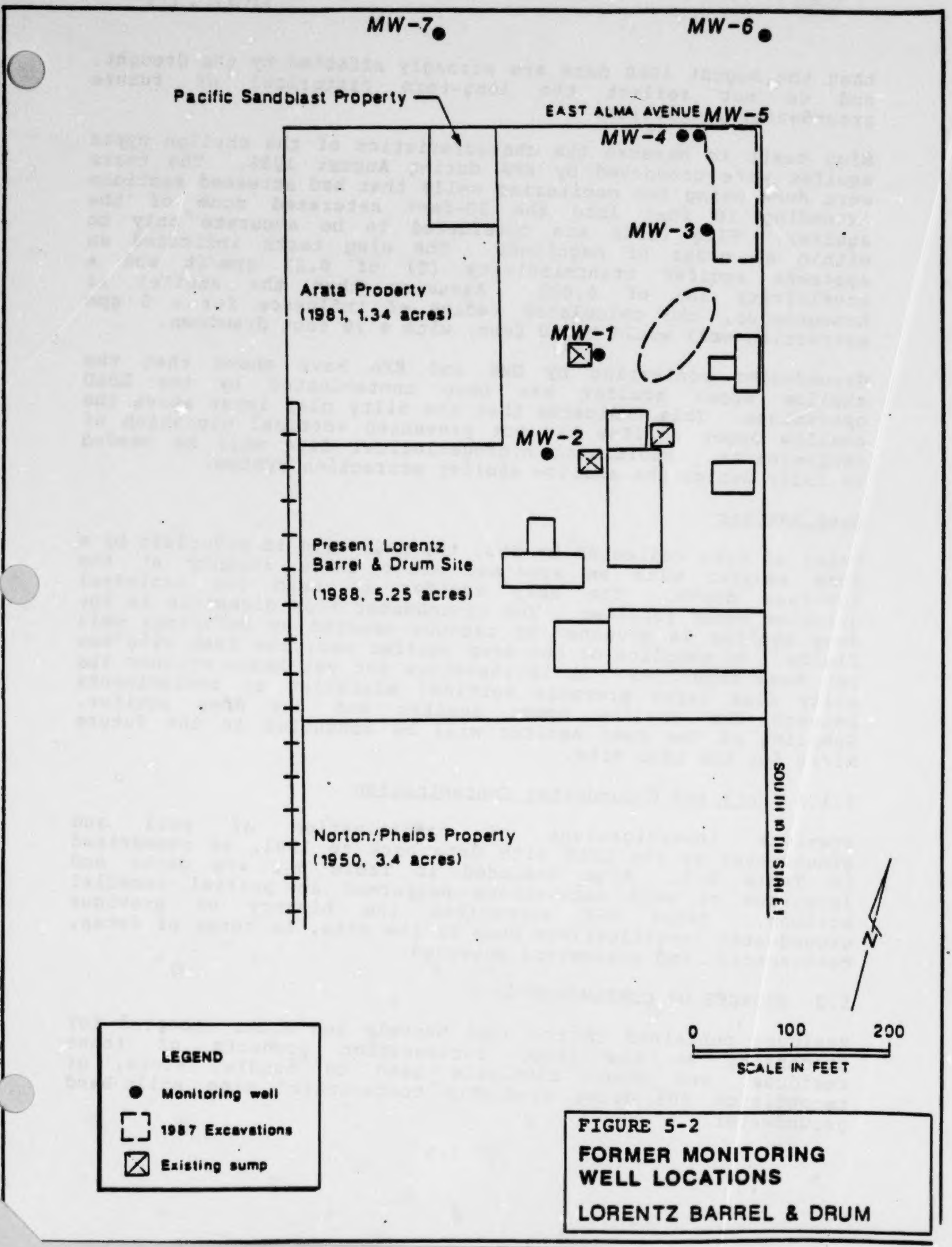

MW-7
MW-6
Pacific Sandblast Property
EAST ALMA AVENUE
MW-5
MW-4
MW-3
Arata Property
(1981, 1.34 acres)
MW-1
MW-2
Present Lorentz
Barrel & Drum Site
(1988, 5.25 acres)
Norton/Phelps Property
(1950, 3.4 acres)
SOUTH TENTH STREET
N
0
100
200
SCALE IN FEET
LEGEND
● Monitoring well
1987 Excavations
☒ Existing sump

FIGURE 5-2
FORMER MONITORING
WELL LOCATIONS
LORENTZ BARREL & DRUM

that the August 1988 data are strongly affected by the drought, and do not reflect the long-term historical or future groundwater properties.

Slug tests to measure the characteristics of the shallow upper aquifer were conducted by EPA during August 1988. The tests were done using two monitoring wells that had screened sections extending 10 feet into the 30-foot saturated zone of the aquifer. Slug tests are considered to be accurate only to within an order of magnitude. The slug tests indicated an apparent aquifer transmissivity (T) of 0.22 gpm/ft and a storitivity (S) of 0.001. Assuming that the aquifer is homogeneous, the calculated radius of influence for a 5 gpm extraction well would be 50 feet, with a 10 foot drawdown.

Groundwater monitoring by DHS and EPA have shown that the shallow upper aquifer has been contaminated by the LB&D operations. This indicates that the silty clay layer above the shallow upper aquifer has not prevented vertical migration of contaminants. Additional hydrogeological data will be needed to fully design the shallow aquifer extraction system.

Deep Aquifer

Based on data collected by DHS, the LB&D site is underlain by a deep aquifer with an apparent water table roughly at the 100-foot depth. The deep aquifer is used for municipal drinking water supplies. The groundwater flow direction in the deep aquifer is governed by troughs created by municipal well fields. No sampling of the deep aquifer near the LB&D site has yet been conducted. It is therefore not yet known whether the silty clay layer prevents vertical migration of contaminants between the shallow upper aquifer and the deep aquifer. Sampling of the deep aquifer will be conducted in the future RI/FS for the LB&D site.

5.1.3 Soil and Groundwater Contamination

Previous investigations of contamination of soil and groundwater at the LB&D site date back to 1981, as summarized in Table 5-1. Also included in Table 5-1 are dates and locations of soil excavations performed as partial remedial actions. Table 5-2 summarizes the history of previous groundwater investigations done at the site, in terms of dates, contractors, and parameters measured.

5.2 SOURCES OF CONTAMINATION

Residues contained in the used barrels and drums accepted for processing at the site, incineration products of those residues, and other chemicals used to handle, store, or recondition the drums gradually contaminated site soils and groundwater.

TABLE 5-1
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
8-81	DHS	DHS	DHS	25 surface soil samples around site	Metals, Purgeables (EPA 624) Organophosphorus Pesticides (EPA 614) Chlorinated Pesticides/ PCBs (EPA 608)	Cd, Cr, Pb PCBs, DDE	N/A	Toluene, Xylenes, Ethylbenzene, Diazinon, Malathion, Ethion, etc. g-BHC, Heptachlor, Heptachlor Epoxide
9-82 10-82	LB&D	Associated Labs	Associated Labs	35 subsurface soils (A few sediment/liquids from around site)	Metals, Chlorinated Pesticides/PCBs (EPA 608)	Pb, Ni PCBs, DDD, DDE	N/A	Cr DDT
10-83	LB&D	Feuerstein	B&C	18 surface soils along drainage ditch	Chlorinated Pesticides/ PCBs (EPA 608)	PCBs, chlordane, DDD, DDE	N/A	DDT
11-83	LB&D	Geotechnical Consultants for Feuerstein	B&C	Monitoring wells 1 & 2 installed - soils sampled in borewells at 10' depth - groundwater from wells 1 & 2 sampled	Metals, CN^-, Phenols Purgeables (EPA 625) Chlorinated Pesticides/ PCBs (EPA 608) Extractables (EPA 625)	None	As, benzene, chloroform, PCE, TCE, 1,1-DCE	Soil: Various VOCs (TCE, Xylenes, etc.) Various VOCx and semi-VOCs
11-83	LB&D	Feuerstein	N/A	Excavation of soil in & around drainage ditch	Excavation only; no samples taken	N/A	N/A	N/A
1-84	LB&D	Feuerstein	B&C	12 soil samples taken at base of excavation	Chlorinated Pesticides/ PCBs (EPA 608)	PCBs, chlordane, DDD, DDE, DDT	N/A	None

TABLE 5-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
1-84	LB&D	Feuerstein		Further excavation of soil in and around drainage ditch	Excavation only; no samples taken	N/A	N/A	N/A
1-84	LB&D	Feuerstein	B&C	1 soil sample at base of excavation	Chlorinated Pesticides/ PCBs (EPA 608)	None	N/A	None
1-84	LB&D	Geotechnical Consultants for Feuerstein	B&C	Monitoring Well 3 Installed - soil sampled in borehole at 10' depth - groundwater sampled MW-3	Chlorinated Pesticides/ PCBs (EPA 608) Purgeable Halocarbons (EPA 601)	None	PCBs, TCE PCE, 1,1-DCE	Soil: PCBs, PCE Groundwater: 1,1,1-TCA
1-84	LB&D	Feuerstein	B&C	Monitoring wells 1, 2, 3 sampled	Purgeable Halocarbons (EPA 601)	N/A	1,1-DCE,1,2-DCE, Dichloropropane, PCE, TCE	Freon 113, 1,1,1-TCA, 1-DCA
3-85	DHS	DHS	DHS & McKesson	4 surface soils on & offsite	Metals Purgeables Chlorinated Pesticides/ PCBs (EPA 608) Semivolatiles (EPA 625) Total Hydrocarbons	DDD, DDE, DDT	N/A	PCBs, PCE, Toluene, Ethylbenzene, Xylenes

TABLE 5-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
3-85	LB&D	Feuerstein	N/A	Excavation of soil at 6 locations around	Excavation only; no samples taken	N/A	N/A	N/A
3-85	LB&D	Conservtech	Associated	5 soils at base of excavation	Metals Purgeables (EPA-624) Chlorinated Pesticides/ PCBs (EPA 608)	PCBs	N/A	DDD, DDE, Pb, TCE, PCE
4-85	LB&D	Geotechnical Cons.	Associates Labs	Monitoring wells 4 & 5 installed and sampled	Purgeable Halocarbons (EPA 601) Chlorinated Pesticides/ PCBs (EPA 608) Semi-volatiles (EPA 625)	N/A	1,2-DCE, 1,2-DCA, PCE, TCE	None
4-85	LB&D	Reed	B&C	Monitoring wells 1 & 5 sampled	Purgeables (EPA 624)	N/A	None	Freon 113
5-85	DHS LB&D	DHS Reed	DHS B&C	18 soil samples taken at base of excavation Splits sent to different labs	Pb PCBs	PCBs	N/A	Pb
6-85	LB&D	Reed	N/A	Excavation of soil in Area 3	N/A	N/A	N/A	N/A
6-85	DHS LB&D		DHS B&C	15 soil samples taken around the site, splits sent to different labs	Metals Chlorinated Pesticides/ PCBs (EPA 608) Organophosphorus Pesticides (EPA 614)	Cd, Pb, PCBs, DDE	N/A	Dieldrin, disulfoton, methyl parathion, ethion, azinphos-methyl

TABLE 5-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
6-85	DHS LB&D	DHS Reed	DHS B&C	32 soil samples from area near processing facility; Splits sent to different labs	Chlorinated Pesticides/ PCBs (EPA 608) Extractables (EPA 625) Organophosphorus pesticides (EPA 614) VOA's (EPA 5020-GC/MS)	PCBs	N/A	Parathion
7-85	DHS	DHS	DHS	1 soil sample east of main building	Metals PCBs	PCBs	N/A	None
6-86	LB&D	Reed	THA (EAL)	Monitoring wells 6 & 7 installed and samples taken from monitoring wells 1, 2, 3, 4, 6, and 7	Purgeable Halocarbons (EPA 601)	N/A	1,2-Dichloropropane, chlorform, TCE, vinyl chloride, 1,1,1-TCA, 1,1-DCE, 1,2-DCE, PCE, 1,2-DCA, PCE, 1,2-DCA	Chloroethane, 1,1-DCA, Bromodichloromethane
10-86	DHS	CH2M Hill	CH2M Hill	Monitoring wells 4 and 6 sampled	Metals Purgeables (EPA 624) Chlorinated Pesticides/ PCBs	N/A	Ba Benzene, vinyl chloride, 1,1-DCE 1,2-DCE 1,2-Dichloropropane, TCE, 1,1,2,2-PCA chlordane, PCBs	Toxaphene, phthalates
8-87 11-87	DHS	CH2M Hill	TRC	Soil-gas and groundwater study offsite	Volatile organic compounds (TRC, November 1987	N/A	N/A	Offsite plume; TCE, TCA, Freon 113, Vinyl chloride

TABLE 5-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
Mid-87	DHS	Canonie	Canonie & Acurex	Soil sampled in Perimeter & "Hot Spot" areas in northern part of site	Metals VOCs (EPA 624) Semi-VOCs (EPA 625) Organochlorine Pesticides/PCBs (EPA 614)	Cd, Cr, Pb, Ni, PCBs, DDD, DDT, Xylenes, Benzene, Ethybenzene, Toluene	N/A	None
Late 87	DHS	Canonie	N/A	Excavation of soil Drum removal etc.	Excavation only; no samples taken	N/A	N/A	N/A
Early 88	DHS EPA	IT E&E	Curtis & Tomkins	Post excavation soil sampling	Metals, Semi-volatile Organics (EPA 3270) Organochlorine Pesticides/PCBs (EPA 8080) Volatiles (EPA 8240)	PCBs (some samples)	N/A	None
Early 88	EPA Emergency Response Division	EPA/E&E	Curtis & Tomkins	Incinerator ash from barrel on site sampled; more facility cleanup etc. CHIP and SEAL installed on drum storage area	Metals Dioxins and Furans (EPA 8280)	Pb	N/A	High Cr, Ni, Zn Low concentrations of heptachlorodibenzo-p-dioxin, octachlorodibenzo-p-dioxin, octachlorodibenzo furan
6-88	EPA	EBASCO	CLP	Municipal Well sampling (RI/FS)	Semi-Volatile organics (CLP RAS) Pesticide/PCBs (CLP RAS)	Data not received yet	Data not received yet	Data not received yet

TABLE 5-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
7-88	EPA	EBASCO	Hittman-Ebasco	Groundwater characterization sampling for treatability study (RI/FS)	Metals Semi-volatile organics (EPA 601/602, 624) Organochlorine pesticides/ PCBs (EPA 605/608) Phenols (EPA 606) Phthalate esters (EPA 604) Chemical & Physical Properties (EPA) Dioxins (EPA 8280) modified)	N/A Data not yet received (dioxins)	Vinyl chloride 1,1-DCA; 1,2-DCP; TCE; Benzene; PCE*	Acetone 1,1-DCA; trans-1,2-DCE; 1,1,1-TCA; Toluene; Chlorobenzene; Ethylbenzene*

ABBREVIATIONS:

B&C - Brown and Caldwell
Canonie - Canonie Environmental
CLP - Contract Laboratory Program
DHS - California Department of Health Services
E&E - Ecology & Environment
EBASCO - Ebasco Services, Incorporated
EPA - Environmental Protection Agency
Feuerstein - Feuerstein Associates Consulting Engineers
N/A - Not Applicable

IT - IT Corporation
LB&D - Lorentz Barrel & Drum
McKesson - McKesson Environmental
RAS - Routine Analytical Services
Reed - Reed Corporation
RI/FS - Remedial Investigation/Feasibility Study
TMA - Thermo Analystical, Inc.
TRC - Tracer Research Corporation
* - Results preliminary awaiting validation (Ebasco 1988)

TABLE 5-2

GROUNDWATER ANALYSES

Date Sampled	Client	Sampled By	Analyzed By	Analytical Method	Analyte/Method
11-23-83	LB&D	Feuerstein & Associates	Brown & Caldwell Laboratory	Unknown	Metals, CN, Phenols
				EPA 624	Purgeables/Gas Chromatography-Mass Spectrometry (GC-MS)
				EPA 625	Extractables/CG-MS
01-20-84	LB&D	Feuerstein & Associates	Brown & Caldwell Laboratory	EPA 601	Purgeable Halocarbons/GC
				EPA 608	Chlorinated Pesticides and PCBs/GC
03-02-84	LB&D	Feuerstein & Associates	Brown & Caldwell Laboratory	EPA 601	Purgeable Halocarbons/GC
04-04-85	LB&D	Geotechnical Consultants, Inc.	Associated Laboratories	EPA 601	Purgeables/GC
				EPA 624	Semivolatile Organics/GC-MS
				EPA 608	Chlorinated Pesticides and PCBs/GC
04-29-85	LB&D	Reed Corporation	Brown & Caldwell Laboratory	EPA 624	Purgeables
07-86	LB&D	Reed Corporation	Thermo Analytical, Inc./ Environmental Research Group	EPA 601	Purgeable Halocarbons/GC
10-02-86	DHS	CH2M Hill, Inc.	CH2M Hill Environmental Laboratory	Unknown	Metals
				EPA 624	Purgeables/GC-MS
				EPA 608	Organochlorine Pesticides and PCBs/GC
				EPA 625	Semivolatiles Organics/GC-MS
				Unknown	Minerals
06-30-88	EPA	Ebasco Services, Inc.	Contract Laboratory Program	CLP RAS	Semivolatile organics/GC-MS
				CLP RAS	Chlorinated Pesticides and PCBs/GC
07-16-88	EPA	Ebasco Services, Inc.	Hittman-Ebasco	EPA 608	Pesticides/PCB
				EPA 604	Phenols
				EPA 606	Phthalate Esters
				EPA 601/ 602 & 624	Volatile organics
				EPA 625	Semivolatiles
				EPA 200 Series	Metals
				EPA Various	Chemical & Physical Properties

5.3 NATURE AND EXTENT OF CONTAMINATION IN THE SHALLOW AQUIFER

The shallow groundwater beneath both onsite and offsite areas is contaminated with volatile organic compounds (VOCs), pesticides, polychlorinated biphenyls (PCBs), and some metals.

Table 5-3 summarizes results of groundwater analyses performed to date by various consultants to LB&D. Table 5-4 provides the maximum contamination levels detected for selected contaminants. No remedial actions to date have addressed groundwater contamination. Therefore, all of these data must be considered in assessing site contamination. Results from Tracer Research Corporation (TRC) 1987 study are shown in Table 5-5. The Data Quality Level (DQL) for the previous studies was taken into consideration by the Regional Board (1981-1986) and DHS (1986-1987) in their decisions as lead agencies at LB&D. For this ROD, EPA has determined that the DQL is Level 3, appropriate for preliminary engineering design.

The 1987 TRC study showed a complex pattern of water contamination (Figure 5-3). In addition, the groundwater samples analyzed from well MW-6 indicate that contaminants other than VOCs have migrated offsite. The potential migration of PCBs is of particular concern. PCBs do not migrate readily in groundwater, but they are soluble in organic solvents (e.g., 1,1,1-TCA and TCE) and can be transported along with those solvents. The lack of information about the transport and actual extent of PCB contamination is one of the major data gaps that needs to be filled by collection and laboratory analysis of samples from groundwater monitoring wells before design of the treatment facility can be implemented. Samples collected for treatability studies in summer 1988 did not have measurable levels of PCBs, but further work needs to be done to confirm this.

Other data gaps which will be addressed during the RI/FS before further remedial action evaluation and design are completed include determination of:

- the types of contaminants comprising the plume(s);
- the vertical and horizontal extent and variability of contamination;
- the extent of actual or potential migration pathways, such as potential conduits between aquifers; and
- the potential for vertical migration between aquifers, via either natural or man-made discontinuities.

TABLE 5-3
SUMMARY OF MONITORING WELL DATA

(units for analysis are specified for each category of analyte in Column 1.)

Analyte	MW-1				MW-2			MW-3			MW-4		MW-4A (a)	MW-4B (a)
	B & C (b)			TMA (c)	B & C (b)		TMA (c)	B & C (b)		TMA (c)	Associated	TMA (c)	CH2M Hill	CH2M Hill
	11/83	3/84	4/85	7/86	11/83	3/84	7/86	1/84	3/84	7/86	4/85	7/86	10/86	10/86
METALS (ppb)														
Arsenic	3.0				4.0								---	---
Barium													160.0	160.0
Chromium (total)	0.3				0.1								---	---
Cobalt													60.0	50.0
Molybdenum													---	20.0
Nickel	43.0				33.0								130.0	120.0
Vanadium													30.0	30.0
Zinc	---				---								20.0	20.0
VOLATILE ORGANICS (ppb)														
Benzene	1.0				---								26.0 (d)	26.0 (d)
Chloroethane	---			---	---		---			---	---	24.0	---	---
Chloroform	---			11.0	2.0		1.4			29.0	---	---	---	---
1,1-Dichloroethane	10.0	51.0		11.0	---	---	---		46.0	40.0	---	85.0	38.0 (d)	41.0 (d)
1,2-Dichloroethane	---			---	---		---			18.0	---	58.0	---	---
1,1-Dichloroethene	12.0	9.0		9.0	---	---	---	29.0	47.0	22.0	---	160.0	90.0	97.0
Trans-1,2-Dichloroethene	9.0	10.0		8.4	---	---	---		105.0	91.0	240.0	750.0	430.0	488.0
Methylene Chloride	---			---	---		---			---	---	---	26.0 (d)	---
1,2-Dichloropropane	4.0	3.0		1.7	---	---	---		45.0	60.0	---	170.0	89.0	92.0
Tetrachloroethene	5.0	2.0		(e)	---	---	(e)	17.0	38.0	(e)	---	(e)	---	---
1,1,2,2-Tetrachloroethane	---			3.0(e)	---		---(e)			65.0(e)	---	140.0(e)	91.0	106.0
1,1,1-Trichloroethane	30.0	33.0		34.0	2.0	---	0.36	26.0	34.0	60.0	---	220.0	75.0	83.0
Trichloroethene	59.0	54.0		61.0	---	---	---	640.0	1000.0	950.0	510.0	1100.0	1766.0	2108.0
Vinyl Chloride	---			---	---		---			62.0	---	1100.0	455.0	553.0
Freon 113	30.0	26.0	4.0		7.0	6.0			41.0					
Carbon Disulfide	---				3.0								---	---
Bromodichloromethane	---			---	---		---			1.5	---	---	---	---
Dichlorotrifluoroethane	50.0				6.0									
C6H12 Cyclic Hydrocarbon	5.0													
SEMI-VOLATILE ORGANICS (ppb)														
Di-n-Butyl Phthalate (f)													31.0	24.0
Butylbenzyl Phthalate (f)													---	17.0
Bis(2-Ethyl Hexyl)Phthalate (f)											5100.0		73.0	680.0
Di-n-Octyl Phthalate (f)													---	60.0

(a)	Splits of sample collected from MW-4 (10-86)
(b)	Brown & Caldwell
(c)	Thermo Analytical, Inc.
(d)	Indicates an Estimated Trace Value
(e)	Co-Eluting Compounds
(f)	Phthalates are most probably laboratory contaminants
---	Not Detected
(blank)	Not Analyzed

TABLE 5-3 (continued)
SUMMARY OF MONITORING WELL DATA
(units for analysis are specified for each category of analyte in Column 1.)

Analyte	MW-5		MW-6		MW-7	MW-16	MW-16 (field duplicate)	MW-20
	Associated 4/85	B & C (b) 4/85	TMA (c) 7/86	CH2M Hill 10/86	TMA (c) 7/86	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88
METALS (ppb)								
Arsenic				---		---	---	---
Barium				110.0		141	128	99
Chromium (total)				10.0		1.9	2.4	2.3
Cobalt				20.0		13	15	11
Molybdenum				20.0				
Nickel				60.0		72	71	---
Vanadium				30.0		25	32	25
Zinc				---				
VOLATILE ORGANICS (ppb)								
Benzene				---		8	8	3
Chloroethane	---		---	---	---	---	---	---
Chloroform	---		9.9	---	---	---	0.5	---
1,1-Dichloroethane	---		35.0	18.0 (d)	1.0	14	16	3
1,2-Dichloroethane	4.8		8.5	---	270.0	---	20	---
1,1-Dichloroethene	---		49.0	33.0	1.7	27	29	86
Trans-1,2-Dichloroethene	---		120.0	61.0	---	52	56	14
Methylene Chloride	---		---	---	---	---	---	---
1,2-Dichloropropane	---		23.0	---	---	18	19	1
Tetrachloroethene	23.0		(e)	---	(e)	18	19	---
1,1,2,2-Tetrachloroethane	---		60.0(e)	22.0 (d)	---(e)	---	---	---
1,1,1-Trichloroethane			32.0	14.0 (d)	5.2	11	12	34
Trichloroethene	45.0		770.0	413.0	0.5	300	311	2
Vinyl Chloride	---		510.0	60.0	---	66	72	8
Freon 113		---						
Carbon Disulfide				---		---	---	---
Bromodichloromethane	---		---	---	---	---	---	---
Dichlorotrifluoroethane								
C6H12 Cyclic Hydrocarbon								
SEMI-VOLATILE ORGANICS (ppb)								
Di-n-Butyl Phthalate (f)				113.0		---	---	---
Butylbenzyl Phthalate (f)				32.0		---	---	---
Bis(2-Ethyl Hexyl)Phthalate (f)	---			39.0		---	---	---
Di-n-Octyl Phthalate (f)				---		---	---	---

(a)	Splits of sample collected from MW-4 (10-86)
(b)	Brown & Caldwell
(c)	Thermo Analytical, Inc.
(d)	Indicates an Estimated Trace Value
(e)	Co-Eluting Compounds
(f)	Phthalates are most probably laboratory contaminants
---	Not Detected
(blank)	Not Analyzed

TABLE 5-3 (continued)
SUMMARY OF MONITORING WELL DATA
(units for analysis are specified for each category of analyte in Column 1.)

Analyte	MW-1		MW-2		MW-3		MW-4		MW-4A (a)	MW-4B (a)
	B & C (b) 11/83 3/84 4/85	TMA (c) 7/86	B & C (b) 11/83 3/84	TMA (c) 7/86	B & C (b) 1/84 3/84	TMA (c) 7/86	Associated 4/85	TMA (c) 7/86	CH2M Hill 10/86	CH2M Hill 10/86
EXTRACTABLES (ppb)										
Isophorone	2.0									
Dimethylethoxyethanol	2.0									
>C9 Aldehyde	2.0									
Docosanoic Acid	2.0									
Hexadecanoic Acid	4.0									
C4 Benzoic Acid	2.0									
>C10 Fatty Acid			1.0							
MINERALS (ppm)										
Calcium									97.0	96.0
Magnesium									140.0	140.0
Potassium									0.92	1.0
Sodium									200.0	210.0
Bicarbonate									1293.0	1220.0
Carbonate									---	---
Chloride									79.0	78.0
Nitrate										
Phosphate										
Sulfate									83.8	82.0
Silica									24.0	26.0
CaCO3									24.0	26.0
PESTICIDES (ppb)										
Chlordane	---		---		---		---		0.2	0.1
Toxaphene	---		---		---		---		1.0	2.0
POLYCHLORINATED BYPHENYLS (ppb)										
PCB 1221									2.0	3.0
PCB 1242									1.0	---
PCB 1254									0.4	0.4
PCB 1260					0.36					

(a) Splits of sample collected from MW-4 (10-86)
(b) Brown & Caldwell
(c) Thermo Analytical, Inc.
(d) Indicates an Estimated Trace Value
(e) Co-Eluting Compounds
(f) Phthalates are most probably laboratory contaminants
--- Not Detected
(blank) Not Analyzed

TABLE 5-3 (continued)
SUMMARY OF MONITORING WELL DATA
(units for analysis are specified for each category of analyte in Column 1.)

Analyte	MW-5		MW-6		MW-7	MW-16	MW-16 (field duplicate)	MW-20
	Associated 4/85	B & C (b) 4/85	TMA (c) 7/86	CH2M Hill 10/86	TMA (c) 7/86	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88
EXTRACTABLES (ppb)								
Isophorone								
Dimethylethoxyethanol								
>C9 Aldehyde								
Docosanoic Acid								
Hexadecanoic Acid								
C4 Benzoic Acid								
>C10 Fatty Acid								
MINERALS (ppm)								
Calcium				73.0		70	67	123
Magnesium				110.0		123	118	15
Potassium				1.12		---	---	1.8
Sodium				290.0		297	285	659
Bicarbonate				1250.0				
Carbonate				---				
Chloride				55.0				
Nitrate								
Phosphate								
Sulfate				95.0		83	73	253
Silica				24.0				
CaCO3				24.0		613	601	870
PESTICIDES (ppb)								
Chlordane	---			---		---	---	---
Toxaphene	---			---		---	---	---
POLYCHLORINATED BYPHENYLS (ppb)								
PCB 1221				4.0		---	---	---
PCB 1242				---		---	---	---
PCB 1254				0.2		---	---	---
PCB 1260						---	---	---

(a)	Splits of sample collected from MW-4 (10-86)
(b)	Brown & Caldwell
(c)	Thermo Analytical, Inc.
(d)	Indicates an Estimated Trace Value
(e)	Co-Eluting Compounds
(f)	Phthalates are most probably laboratory contaminants
---	Not Detected
(blank)	Not Analyzed

TABLE 5-4
MAXIMUM GROUNDWATER CONTAMINATION LEVELS DETECTED AT LORENTZ BARREL AND DRUM SITE[+]

Analyte	DHS Action Criteria References[a,b] (ppb)	Highest Level Detected[a] (ppb)	Date
METALS			
Arsenic	0.002 (2)	4.00*	11/83
Barium	10.00 (3)	160.00*	10/86
Chromium (total)	51.00 (3)	10.00	10/86
Cobalt		60.00	10/86
Molybdenum		20.00	10/86
Nickel	150.00 (1)	130.00	10/86
Vanadium		30.00	10/86
Zinc	7,400 (3)	20.00	10/86
VOLATILE ORGANICS			
Benzene	0.70 (1,4)	26.00*	10/86
Chloroethane		24.00	07/86
Chloroform	0.50 (3)	29.00*	07/86
1,1-Dichloroethane	4,000.00 (3)	85.00	07/86
1,2-Dichloroethane	0.51 (3)	270.00*	07/86
1,1-Dichloroethene	LOQ (4)	160.00*	07/86
trans-1,2-Dichloroethene	70.00 (1)	750.00*	07/86
Dichloromethane	10.00 (4)	26.00*	10/86
1,2-Dichloropropane	10.00 (4)	170.00*	07/86
Tetrachloroethene	0.87 (3)	140.00*[c]	07/86
1,1,2,2-tetrachloroethane	0.17 (3)	106.00*	10/86
1,1,1-Trichloroethane	200.00 (4)	220.00*	07/86
Trichloroethene	1.80 (3)	2,108.00*	10/86
Vinyl Chloride	0.015 (3)	1,100.00*	07/86
Freon 113		41.00	03/84
PESTICIDES			
Chlordane	0.05 (4)	0.20*	10/86
Toxaphene	35.00 (2)	2.00	10/86
POLYCHLORINATED BIPHENYLS			
PCBs	0.008 (3)	6.40*	10/86

---

[a] Concentrations are shown in parts per billion (ppb) unless otherwise indicated.

[b] DHS Action Criteria are as defined in a March 17, 1986, memorandum from David J. Leu, Ph.D., DHS's Chief of Alternative Technology and Policy Development Section, Toxic Substances Control Division, to all Section Chiefs in DHS's Toxic Substance Control Division. Reference numbers are shown in parentheses and indicate the source of each criterion. These sources are listed in the Reference section following this table.

[c] 140.00 ppb is the sum of PCE and 1,1,2,2-tetrachloroethane concentrations.

NOTES: DHS = Department of Health Services
LOQ = Limit of Quantification
* = exceeds DHS Action Criterion

1. Draft Health Advisories. Office of Drinking Water.
U.S. Environmental Protection Agency. Washington, D.C.
September 30, 1985

2. Ambient Water Quality Criteria Documents.
Office of Water Regulations and Standards.
U.S. Environmental Protection Agency, Washington, D.C.
October 1980. (Values adjusted for drinking water.)

3. Draft Health Effects Assessment Documents
Office of Emergency and Remedial Response
Office of Environmental Criteria and Assessment
U.S. Environmental Protection Agency
Cincinnati, Ohio. September 1984.

4. Sanitary Engineering Branch California Department of Health Services
Berkeley, California. 1985

[+] CH2M Hill. February 1987. Preliminary Site Assessment Report. Lorentz Barrel & Drum (LB&D). Prepared for California Department of Health Services (DHS).

TABLE 5-5

ANALYTICAL RESULTS OF GROUNDWATER

(Tracer Research Corporation, Groundwater Investigation at Lorentz Barrel & Drum, November 1987)

SAMPLE	DEPTH (feet)	DATE	FREON 113	TRICHLOROETHANE	TRICHLOROETHENE	PERCHLOROETHENE	CIS-1,2-DICHLOROETHENE	VINYL CHLORIDE	TOTAL HYDROCARBONS (w/out Methane)
W2	27	11/18	22	90	2600	11	<3	520	560
W3	27	11/18	3	5	54	0.2	<3	<0.2	8
W4	20	11/19	<0.3	28	30	0.1	<17	<0.2	14
W5	20	11/19	<0.02	60	<0.02	<0.004	<3	<0.2	66
W6	26	11/19	<0.02	53	3	<0.004	<3	<0.2	27
W7	26	11/19	<0.02	7	<0.02	<0.004	<3	<0.2	<7
W8	20	11/19	<0.02	68	1	<0.004	<3	110	750
W9	26	11/19	<0.02	14	<0.02	<0.004	<3	<0.2	<7
W10	26	11/19	<0.02	<0.008	<0.02	<0.004	<3	<0.2	<7
W11	26	11/19	<0.02	4	<0.02	<0.004	<3	<0.2	<7
W12	26	11/19	<0.02	64	<0.02	<0.004	<3	<0.2	38
W13	26	11/19	<0.02	60	<0.02	<0.004	<3	<0.2	12
W14	25	11/20	<0.02	20	<0.02	<0.004	<3	<0.2	8
W15	26	11/20	<0.02	69	<0.02	<0.004	<3	<0.2	14
W16	24	11/30	<0.02	62	0.8	0.1	<4	<0.2	9
W18	25	11/30	0.2	33	<0.02	<0.05	<4	<0.2	<9
W19	26	11/30	<0.02	<0.009	<0.02	<0.005	<4	<0.2	<9
W20	26	11/30	<0.03	0.03	<0.02	<0.006	<4	<0.2	<14

All results in parts per billion (ppb).

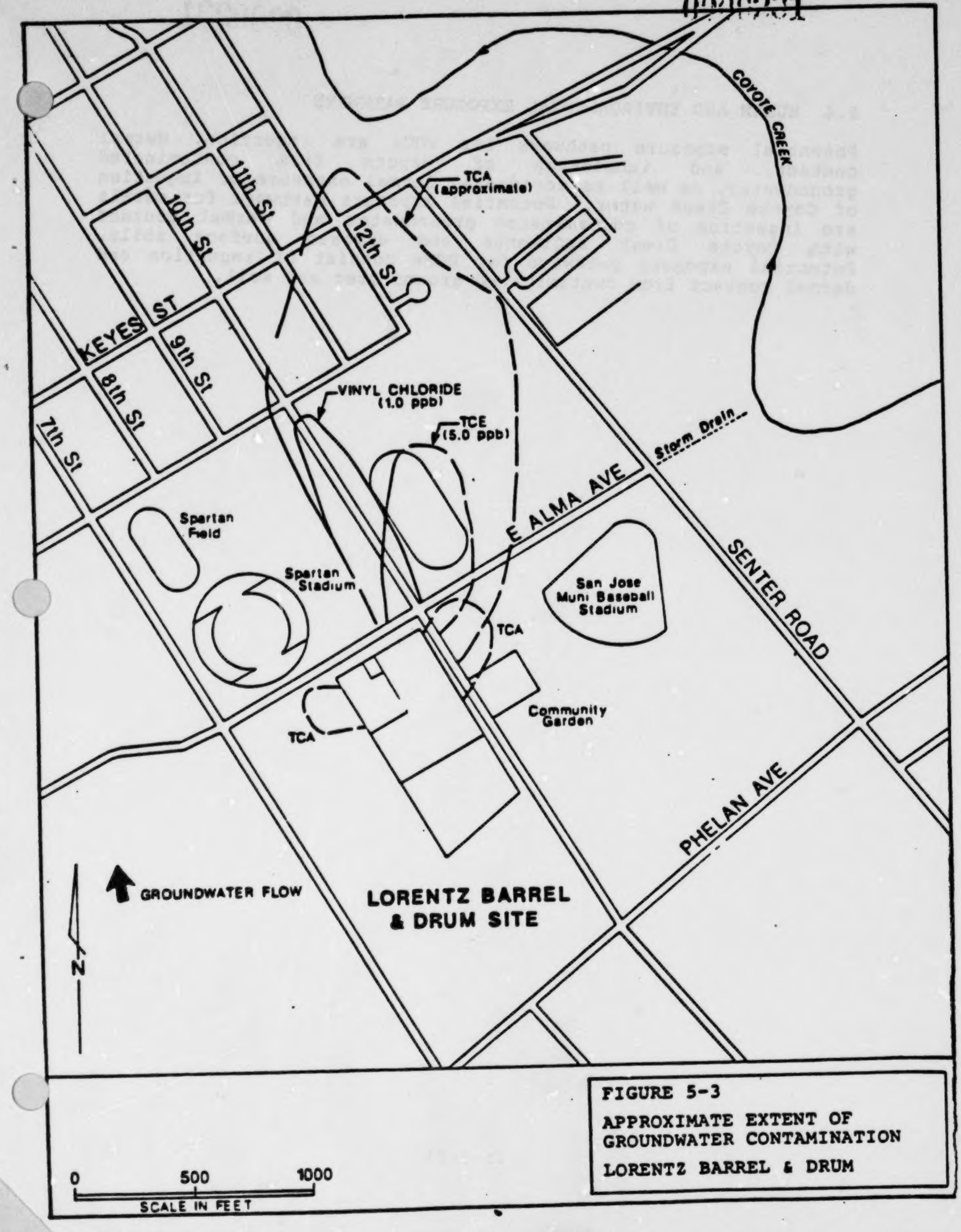

COYOTE CREEK
TCA (approximate)
11th St
10th St
12th St
KEYES ST
9th St
8th St
7th St
VINYL CHLORIDE (1.0 ppb)
TCE (5.0 ppb)
Storm Drain
E ALMA AVE
Spartan Field
Spartan Stadium
San Jose Muni Baseball Stadium
SENTER ROAD
TCA
Community Garden
TCA
PHELAN AVE
GROUNDWATER FLOW
LORENTZ BARREL & DRUM SITE
N
0
500
1000
SCALE IN FEET

FIGURE 5-3

APPROXIMATE EXTENT OF GROUNDWATER CONTAMINATION

LORENTZ BARREL & DRUM

5.4 HUMAN AND ENVIRONMENTAL EXPOSURE PATHWAYS

Potential exposure pathways for VOCs are ingestion, dermal contact, and inhalation of vapors from contaminated groundwater, as well as accidental dermal exposure or ingestion of Coyote Creek water. Potential exposure pathways for metals are ingestion of contaminated groundwater and dermal contact with Coyote Creek sediments and exposed surface soils. Potential exposure pathways for PCBs consist of ingestion and dermal contact from contaminated groundwater and soil.

6.0 SUMMARY OF SITE RISKS

A screening-level health risk assessment was conducted to evaluate potential health risks related to remediation of the LB&D site by groundwater treatment alternatives described in Engineering Evaluation and Cost Analysis (EE/CA) (Ebasco, May 1988). Since the groundwater treatment system is designed to remediate groundwater contamination only, the scope of this assessment focused on drinking water-related health risks as the primary exposure route. However, since one of the treatment alternatives also involved air emissions of the extracted contaminants, the additional health risks associated with these emissions were also evaluated. Because this is a screening-level assessment, adverse health impacts were quantified only in terms of increased risk of cancer. A much more comprehensive analysis of health risks at the LB&D site, including all relevant exposure pathways and an evaluation of noncarcinogenic health risks, will be included in the Remedial Investigation/Feasibility Study (RI/FS) risk assessment.

6.1 CONTAMINANTS OF CONCERN

Contaminants included in the assessment (i.e., contaminants of concern) consisted of all groundwater contaminants identified at or near the LB&D site for which the United States Environmental Protection Agency (EPA) has developed a cancer potency estimate. All such contaminants were assumed to be carcinogens and were included in the analysis regardless of frequency of detection or magnitude of concentration. Exceptions to this rule included phthalates, dichloromethane, cadmium, and chromium. Analytical data for phthalates and dichloromethane contaminants strongly suggested that detection of these contaminants was due to laboratory contamination, therefore these contaminants were not included in the analysis. Cadmium and chromium were also excluded since these compounds are not considered by EPA to be carcinogenic via the oral route of exposure. A complete list of the contaminants included in the analysis, along with the maximum and average concentrations observed at the LB&D site, is provided in Table 6-1.

6.2 EXPOSURE ASSESSMENT

The potential exposure pathways associated with contamination of the shallow groundwater are illustrated in Figure 6-1. Figure 6-1 includes all pathways of potential significance. However, since this was a screening-level assessment, only the most significant exposure pathways were quantitatively evaluated. These pathways were considered to be drinking water and inhalation (air stripper emissions only). Quantitative evaluation of all other pathways will be included in the RI/FS risk assessment.

TABLE 6-1

CONTAMINANTS OF CONCERN IN THE SHALLOW GROUNDWATER AT LORENTZ BARREL & DRUM

	Maximum Concentrations Found (ug/l)[1]	Estimated Average Concentration In The Plume (ug/l)	Expected NPDES Discharge Limits (ug/l)[2]
1,1 Dichloroethene	160	26	5
1,1,2,2 Tetrachloroethane	106	28	5
1,2 Dichloroethane	270	16	1
Arsenic	4.0	0.2	20
Benzene	26	6.2	0.5
Chlordane	0.2	0.01	0.014
Chloroform	29	8.0	5
PCBs (total)	6.4	0.31	0.065
Tetrachloroethene	140	17	5
Toxaphene	2.0	0.10	0.24
Trichloroethene	2,108	651	5
Vinyl chloride	1,100	155	2

[1] Source: CH2M Hill, February 1987, Preliminary Site Assessment Report, Lorentz Barrel & Drum

[2] Source: California Regional Water Quality Control Board, San Francisco Bay Region, Basin Plan Review, November 1986

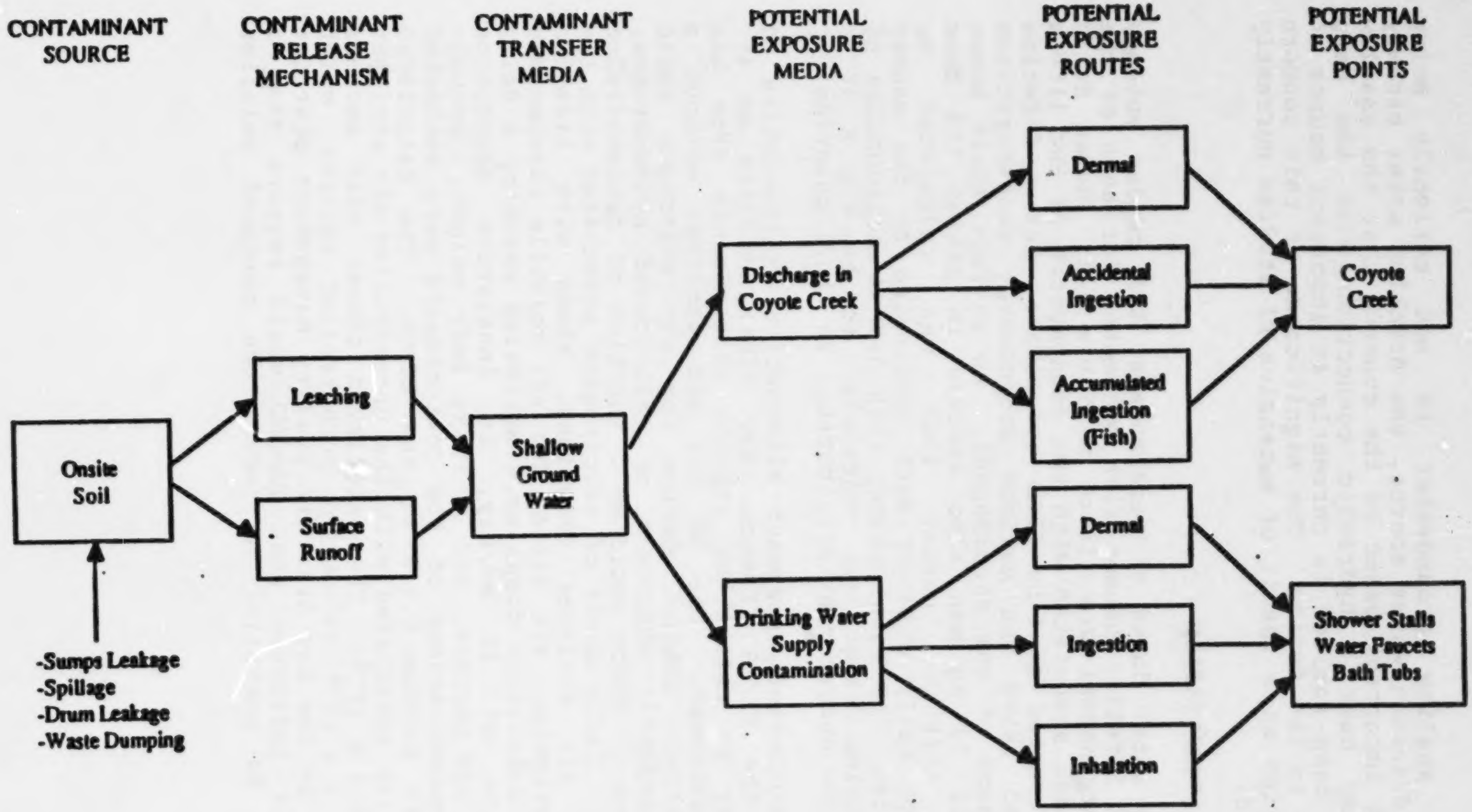

CONTAMINANT SOURCE
CONTAMINANT RELEASE MECHANISM
CONTAMINANT TRANSFER MEDIA
POTENTIAL EXPOSURE MEDIA
POTENTIAL EXPOSURE ROUTES
POTENTIAL EXPOSURE POINTS
Onsite Soil
-Sumps Leakage
-Spillage
-Drum Leakage
-Waste Dumping
Leaching
Surface Runoff
Shallow Ground Water
Discharge In Coyote Creek
Drinking Water Supply Contamination
Dermal
Accidental Ingestion
Accumulated Ingestion (Fish)
Dermal
Ingestion
Inhalation
Coyote Creek
Shower Stalls Water Faucets Bath Tubs

FIGURE 6-1
CONCEPTUAL EXPOSURE MODEL - SHALLOW GROUNDWATER CONTAMINATION
LORENTZ BARREL & DRUM

Although the shallow groundwater is not currently being utilized as a drinking water source, the drinking water pathway was considered important based on the concern that the shallow groundwater may have a hydraulic connection with the deep aquifer. The deep aquifer is currently an important source of drinking water in the region. The significance of this concern will be clarified as a result of extensive RI studies currently being performed.

6.3 RISK CHARACTERIZATION

Daily drinking water doses of carcinogens, EPA cancer potency estimates, and lifetime cancer risk estimates for each of the groundwater carcinogens are listed in Table 6-2. Human daily contaminant doses associated with the consumption of two liters per day of untreated shallow LB&D groundwater for a lifetime were calculated using the maximum groundwater concentrations reported for each of the carcinogens. An average adult human body weight of 70 kg was also assumed in making the dose calculation. Lifetime cancer risk was calculated by multiplying the daily dose of each carcinogen by the cancer potency estimate. The total cancer risk due to consumption of untreated drinking water was calculated to be 8.1×10^{-2}, with most of the cancer risk attributable to vinyl chloride.

One of the groundwater treatment alternatives (Alternative C) discussed in the EE/CA (Ebasco, May 1988) utilizes an air stripping tower to volatilize organic contaminants from the extracted groundwater. Use of the air stripper without a hazardous substance control device for air emissions could result in atmospheric emissions of chlorinated hydrocarbons, the significance of which would be a function of concentration and dispersion. Daily doses of carcinogens associated with the inhalation of air stripper emissions, along with lifetime cancer risk estimates, are listed for all volatile carcinogens in Table 6-3. Inhalation doses were estimated assuming a daily inhalation rate of 20 m^3/day, an inhalation absorption efficiency of 100 percent, and a 70 kg body weight. Annual-average air concentrations of the contaminants were estimated as described in Section 5.4.3 of the EE/CA. The calculated total cancer risk associated with the uncontrolled air stripper emissions is 2.8×10^{-6}. The calculated cancer risk exceeds the allowable 1×10^{-6} value for uncontrolled sources, which is established by the Bay Area Air Quality Management District (BAAQMD). This indicates that BAAQMD would require that a control device be installed to reduce the compound emission rate.

TABLE 6-2

CANCER RISK FROM GROUNDWATER INGESTION: WORST CASE SCENARIO

Compound	Maximum Detected Groundwater Concentration[1] (ug/l)	Estimated Dose* (mg/kg/day)	Cancer Potency (risk/mg/kg/day)	Estimated Risk Level
1,1-Dichloroethene	160	4.58×10^{-3}	5.80×10^{-1}	2.66×10^{-3}
1,1,2,2-Tetrachloroethane	106	4.00×10^{-3}	2.00×10^{-1}	8.00×10^{-4}
1,2-Dichloroethane	270	7.72×10^{-3}	9.10×10^{-2}	7.02×10^{-4}
Arsenic**	4.0	1.14×10^{-4}	1.5×10^{-1}	1.71×10^{-5}
Benzene	26	7.43×10^{-4}	2.90×10^{-2}	2.15×10^{-5}
Chlordane	0.2	5.72×10^{-6}	1.61×10^{0}	9.21×10^{-6}
Chloroform	29	8.29×10^{-4}	8.10×10^{-2}	6.71×10^{-5}
PCBs**	6.4	1.83×10^{-4}	7.7×10^{0}	1.41×10^{-3}
Tetrachloroethene	140	4.00×10^{-3}	5.10×10^{-2}	2.04×10^{-4}
Toxaphene	2.0	5.71×10^{-5}	1.10×10^{0}	6.28×10^{-5}
Trichloroethene	2108	6.03×10^{-2}	1.10×10^{-2}	6.63×10^{-4}
Vinyl Chloride	1100	3.15×10^{-2}	2.30×10^{0}	7.24×10^{-2}
			Total Risk =	8.07×10^{-2}**

[1] Based on highest levels detected in site monitoring wells.

* Dose calculation assumes 2 liters of water consumed daily and a 70 kg body weight consistent with standard United States Environmental Protection Agency (EPA) risk assessment assumptions.

** These are different from the Engineering Evaluation and Cost Analysis (EE/CA) (Ebasco, May 1988) Table 5-1 based on recent EPA revisions to cancer potency estimates.

TABLE 6-3

INHALATION DOSES, CANCER POTENCY ESTIMATES, AND LIFETIME CANCER RISK FOR UNCONTROLLED AIR STRIPPER EMISSIONS

Compound	Inhalation Dose (mg/kg/day)	Cancer Potency Estimate (risk/mg/kg/day)	Incremental Lifetime Cancer Risk[a]
Chloroform	5.0×10^{-7}	8.10E-02	4.1×10^{-8}
1,2-Dichloroethane	1.0×10^{-6}	3.50E-02	3.5×10^{-8}
1,1-Dichloroethene	1.6×10^{-6}	1.16E+00	1.9×10^{-6}
Tetrachloroethene	1.1×10^{-7}	1.70E-03	1.8×10^{-9}
1,1,2,2-Tetra-chloroethane	1.8×10^{-6}	2.00E-01	3.5×10^{-7}
Trichloroethene	4.1×10^{-5}	2.50E-02	1.9×10^{-7}
Vinyl Chloride	9.7×10^{-6}	2.50E-02	2.4×10^{-7}
Total Inhalation Risk			2.8×10^{-6}

[a] lifetime cancer risk=cancer potency estimate x inhalation dose

7.0 DOCUMENTATION OF SIGNIFICANT CHANGES

There have been no significant changes in the alternatives considered since the release of the Engineering Evaluation/Cost Analysis (EE/CA) (Ebasco, May 1988).

8.0 DESCRIPTION OF SHALLOW AQUIFER TREATMENT AND DISPOSAL ALTERNATIVES

8.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Section 121(d) of the Superfund Amendment and Reauthorization Act of 1986 (SARA) requires the consideration of Applicable or Relevant and Appropriate Requirements (ARARs) of environmental laws, ordinances, regulations, and statutes in remedial actions. In addition, SARA requires consideration of other pertinent criteria and advisories that are not yet promulgated. For the Lorentz Barrel & Drum (LB&D) site, ARARs were used to examine the existing situation, possible remedial actions, and potential impacts.

The United States Environmental Protection Agency (EPA) "Interim Guidance on Compliance with ARARs" identifies three separate categories of ARARs:

- ambient or chemical-specific requirements that set health or risk-based concentration limits or ranges for specific chemicals (e.g., Safe Drinking Water Act Maximum Contaminant Levels);
- performance-, design-, or action-specific requirements that regulate particular activities (e.g., the Clean Water Act Pretreatment Standards of Discharge to Publicly-Owned Treatment Works (POTW)); and
- location-specific requirements (e.g., POTW discharge requirements).

Table 8-1 identifies those Federal, State of California, and local regulatory, advisory, and action levels applicable to the groundwater at the LB&D site. The following presents guidelines related to discharge of liquid and gaseous effluents:

- the guidelines on discharge of liquid effluents to surface water bodies are provided in the Basin Plan prepared by the California Regional Water Quality Control Board (CRWQCB). The LB&D discharges to surface waters must satisfy National Pollution Discharge Elimination System (NPDES) discharge requirements. The discharge of water extracted from the shallow aquifer at the LB&D site to the Coyote Creek via a storm drain will require satisfaction of NPDES requirements;

TABLE 8-1
FEDERAL AND STATE OF CALIFORNIA REGULATORY, ADVISORY, AND ACTION LEVELS FOR ANALYTES IN GROUNDWATER

ANALYTE	HIGHEST LEVEL DETECTED IN GROUNDWATER AT THE LBAD SITE ppb (a)	HIGHEST LEVEL DETECTED OFFSITE ppb (b)	EPA MAXIMUM CONTAMINANT LEVEL (c) ppb	EPA MAXIMUM CONTAMINANT LEVEL GOALS (d) ppb	CA DHS DRINKING WATER ACTION LEVELS (e) ppb	NPDES DISCHARGE LIMITS (f) ppb	POTW WASTE DISCHARGE REQUIREMENTS (g) ppb	HEALTH ADVISORIES (h)			EPA NAWQC (i)	
								ACUTE 1 DAY (EXCEPT WHERE NOTED) ppb	CHRONIC NON-CANCER ppb	CHRONIC CANCER ppb/70kg	NON-CANCER ppb	CANCER ppb
METALS												
======												
Arsenic	4.0		50	50		20	1000	50				0.0022
Barium	160.0		1000	1500			5000		1500		2000	
Chromium (total)	10.0		50	120		11	1000	1400 (10 DAY)	120		500	
Cobalt	60.0											
Molybdenum	20.0											
Nickel	130.0					7.1(m)	2600	1000 (10 day)	150		4770	
Vanadium	30.0											
Zinc	20.0					58	2600					
VOLATILE ORGANICS												
=================												
Benzene	26.0 (l)		5	0	0.70	5		233	N/A	0.35		0.66
Chloroethane	24.0					5	10.0 (j)					
Chloroform	29.0		100			5	10.0 (j)					0.19
1,1-Dichloroethane	85.0				20	5	10.0 (j)					
1,2-Dichloroethane	270.0		5	0		1	10.0 (j)	740		0.95		0.94
1,1-Dichloroethene	160.0		7	7	6.0	5	10.0 (j)	2000 (k)	7			0.033
Trans-1,2-Dichloroethene	750.0			70		5	10.0 (j)	20,000	70			
1,2-Dichloropropane	170.0			6		5		90 (10 day)		0.56		
Tetrachloroethene	140.0	11.0		0	4.0	5	10.0 (j)	34000 (10 day) (k)	1940 (k)	0.7		0.8

(a) Chemical data from monitoring well sampling on and nearby offsite (see Table 5-4).
(b) Chemical data from Tracer Research mobile lab study offsite.
(c) US EPA Maximum Contaminant Limit (MCL): 50 CFR 46902; November 13, 1985.
(d) US EPA Proposed MCLG: 50 CFR 46936; November 13, 1985.
(e) Drinking water action levels recommended by the California Department of Health Services, October 1987.
(f) Effluent limitations for discharges to surface waters recommended by California Regional Water Quality Control Board in the Basin Plan, November 1986, which is currently being revised. Depending on site-specific factors, best available technology (BAT) may be required to further reduce concentrations in the discharge.
(g) Industrial Waste Discharge Regulations for that Area Tributary to San Jose-Santa Clara Water Pollution Control Plant, November 1986.
(h) Drinking Water Health Advisories from US EPA Office of Drinking Water Quality. Subject to Change.
(i) NAWQC: National Ambient Water Quality Criteria US EPA 440/5-86-001, May 1986.
(j) Publicly-Owned Treatment Works (POTW) Discharge Limit on Total Chlorinated Organics is 10 ppb.
(k) Draft US EPA Health Advisory.
(l) Estimated trace value.
(m) Interim limit only. Final limit to be established based on future bioassays of LBAD treated effluent.
Blank Space: No existing requirement.

NOTE: Phthalates and dichloromethane were omitted from this table due to unreliability of supporting data. (They appear to be laboratory or field contaminants.)

TABLE 8-1

FEDERAL AND STATE OF CALIFORNIA REGULATORY, ADVISORY, AND ACTION LEVELS FOR ANALYTES IN GROUNDWATER (continued)

ANALYTE	HIGHEST LEVEL DETECTED IN GROUNDWATER AT THE LOAD SITE ppb (a)	HIGHEST LEVEL DETECTED OFFSITE ppb (b)	EPA MAXIMUM CONTAMINANT LEVEL (c) ppb	EPA MAXIMUM CONTAMINANT LEVEL GOALS (d) ppb	CA DHS DRINKING WATER ACTION LEVELS (e) ppb	NPDES DISCHARGE LIMITS (f) ppb	POTW WASTE DISCHARGE REQUIREMENTS (g) ppb	HEALTH ADVISORIES (h)			EPA NAWQC (i)	
								ACUTE 1 DAY (EXCEPT WHERE NOTED) ppb	CHRONIC NON-CANCER ppb	CHRONIC CANCER ppb/70kg	NON-CANCER ppb	CANCER ppb
VOLATILE ORGANICS (continued)												
1,1,2,2-Tetrachloroethane	140.0					5						0.17
1,1,1-Trichloroethane	220.0	90.0	200	200	200	5	10.0 (j)	140000 (k)	200		18400	2.7
Trichloroethene	2100.0	2600.0	5	0	5.00	5	10.0 (j)			2.8		2.7
Vinyl Chloride	1100.0	520.0	2	0	2.00	2	10.0 (j)	2600 (10 day)		0.015		2.0
Freon 113	41.0	22.0			18000	5	10.0 (j)					
PESTICIDES												
Chlordane	0.2			0	0.055	B.D.(m)	10.0 (j)	63		0.0218	0.0043	0.00046
Toxaphene	2.0		5	0		B.D.	10.0 (j)	500		0.031	0.0002	0.00071
POLYCHLORINATED BIPHENYLS												
PCBs	6.4			0		B.D.	10.0 (l)				0.014	0.000079

(a) Chemical data from monitoring well sampling on and nearby offsite (see Table 5-4).
(b) Chemical data from Tracer Research mobile lab study offsite.
(c) US EPA Maximum Contaminant Limit (MCL): 50 CFR 46902; November 13, 1985.
(d) US EPA Proposed MCLG: 50 CFR 46936; November 13, 1985.
(e) Drinking water action levels recommended by the California Department of Health Services, October 1987.
(f) Effluent limitations for discharges to surface waters recommended by California Regional Water Quality Control Board in the Basin Plan, November 1986, which is currently being revised.
Depending on site-specific factors, best available technology (BAT) may be required to further reduce concentrations in the discharge.
(g) Industrial Waste Discharge Regulations for that Area Tributary to San Jose-Santa Clara Water Pollution Control Plant, November 1986.
(h) Drinking Water Health Advisories from US EPA Office of Drinking Water Quality. Subject to Change.
(i) NAWQC: National Ambient Water Quality Criteria US EPA 440/5-86-001, May 1986. (10-4 cancer risk levels)
(j) Publicly-Owned Treatment Works (POTW) Discharge Limit on Total Chlorinated Organics is 10 ppb.
(k) Draft US EPA Health Advisory.
(l) Estimated trace value.
(m) Below detection
Blank Space: No existing requirement.

NOTE: Phthalates and dichloromethane were omitted from this table due to unreliability of supporting data.
(They appear to be laboratory or field contaminants.)

- reinjection of water into an aquifer is controlled by CRWQCB and the provisions of the Safe Drinking Water Act which require that the quality of water should at least meet the drinking water standards prescribed by EPA and California Department of Health Services (DHS). In addition, the best available technology must be used for treatment of water prior to reinjection;
- the discharge of treated groundwater to POTW from the LB&D site is prohibited by San Jose Municipal Code Ordinance #20710, Title 15, Section 15.12.200; and
- the discharge of volatile organic compounds (VOCs) into the atmosphere is controlled by the Bay Area Air Quality Management District (BAAQMD). The releases from the air stripper at the LB&D site will be subject to toxic risk assessment as required by the Air Pollution Control Officer's proposed Guidelines for Risk Screening and Risk Management. The LB&D air stripper would have to satisfy the BAAQMD licensing requirements.

8.2 TREATMENT TECHNOLOGIES

Four alternatives were evaluated in detail in the Engineering Evaluation and Cost Analysis (EE/CA) (Ebasco, May 1988):

Alternative A: No Action (Periodic Groundwater Monitoring);

Alternative B: Groundwater Extraction; Granular Activated Carbon (GAC) Treatment; Disposal of Groundwater to Storm Sewer;

Alternative C: Groundwater Extraction; GAC Guard Bed for PCB Removal; Air Stripping; Fume Incineration or GAC Vapor Control; GAC Polishing Bed; Disposal of Treated Groundwater to Storm Sewer; and

Alternative D: Groundwater Extraction; Ozone-Ultraviolet (ozone-UV); GAC Polishing Bed; Disposal of Groundwater to Storm Sewer.

The primary treatment technologies were chosen on the basis of removal of organics, to the cleanup objective levels given in Table 8-2. Subsequent to the May 1988 EE/CA, and performance of treatability studies and additional groundwater analyses, it was felt that nickel removal may have to be considered in order to attain present NPDES effluent limitations. Therefore, Ebasco has included an example of the type of treatment which

TABLE 8-2
SHALLOW GROUNDWATER CLEANUP OBJECTIVES

Compound	Estimated Contaminant Concentrations In Extracted Groundwater (ug/l)	Expected NPDES Discharge Limit (ug/l)	Federal MCLs (ug/l)	Desired Treated Effluent Level (ug/l)
1,2 Dichloropropane	25	5	NP	5
Trichloroethane	42	5	NP	5
Chloroform	8.0	5	NP	5
1,2-Dichloroethane	16	1	5	1
1,1-Dichloroethene	26	5	7	5
Tetrachloroethene	17	5	NP	5
1,1,2,2-Tetrachloroethane	28	5	NP	5
Trichloroethene	651	5	NP	5
Vinyl Chloride	155	2	2	1
Benzene	6.2	5	5	5
PCBs (Total)	0.31	0.065	0	0.065(1)
Chlordane	0.01	0.014	NP	0.014
Toxaphene	0.1	0.24	5	0.24
Arsenic	0.2	20	50	0.23
Barium	120	NP	1000	N/A
Chromium (Total)	3.0	11	50 (Cr +6)	N/A
Zinc	5.0	58	NP	N/A
Cobalt	13	NP	NP	N/A
Nickel	36	7.1*	NP	7.1*
Minerals (ppm):				
Calcium		97		
Magnesium		140		
Potassium		1		
Sodium		210		
Bicarbonate		1,293		
Chloride		79		
Sulfate		84		
Silica		26		
pH		7.0		

---

* = Interim limit only. Final limit to be established based on future bioassays of LB&D treated effluent.

NP = No limit has been promulgated for this compound.

(1) = 0.065 ug/l is the method detection limit for aroclor 1242 only. The number 0.065 used in this table is meant to represent the detection limits of all the PCB aroclors combined.

could be utilized for nickel treatment, in conjunction with Alternatives B, C, and D. The need to actually utilize such technology however is pending final determination of an appropriate NPDES Permit effluent limitation for nickel. Determination of this effluent limitation will include: an evaluation of whether the source is controlled to the maximum extent feasible; an analysis of the costs and benefits of reducing (treating) nickel concentrations to (as low as) 7.1 ppb; and an assessment of effluent toxicity to fish and/or invertebrates using bioassay procedures to be prescribed by the Regional Water Quality Control Board in conjunction with EPA.

In this section, conceptual designs and order-of-magnitude (-30%, +50%) cost estimates are given for each alternative. For purposes of comparison, cost estimates include potential removal of nickel by the candidate treatment technologies described. Further, they are based on an assumed groundwater flow rate of 100 gallons per minute (gpm). Results of EPA's ongoing RI, which includes aquifer pump tests, will provide the data needed to make an accurate and precise determination of extraction rates prior to final design of the system.

8.2.1 Alternative A: No Action (Periodic Groundwater Monitoring)

The "no action" alternative would require that no remedial or removal actions take place at this time. Adoption of this alternative will require monitoring of plume migration.

Based on the calculations shown in Table 6-2, the "No Action" Alternative would fail to reduce the existing public health risks. However, the ongoing monitoring programs that are included in the "No Action" Alternative would provide an early warning if the drinking water aquifer became contaminated.

8.2.2 Groundwater Extraction System

As discussed in Section 5.0, the level of current information precludes a detailed design for the groundwater extraction system at this time. The design of the system will be provided in more detail after the field activities associated with the RI are performed in October and November 1988. Final design of the entire system will await the initial installation of several of the extraction wells. Nevertheless, for the purposes of the EE/CA, a conceptual design had to be selected to establish a baseline and estimate costs. The extraction well system conceptualized for such purposes is shown on Figure 8-1.

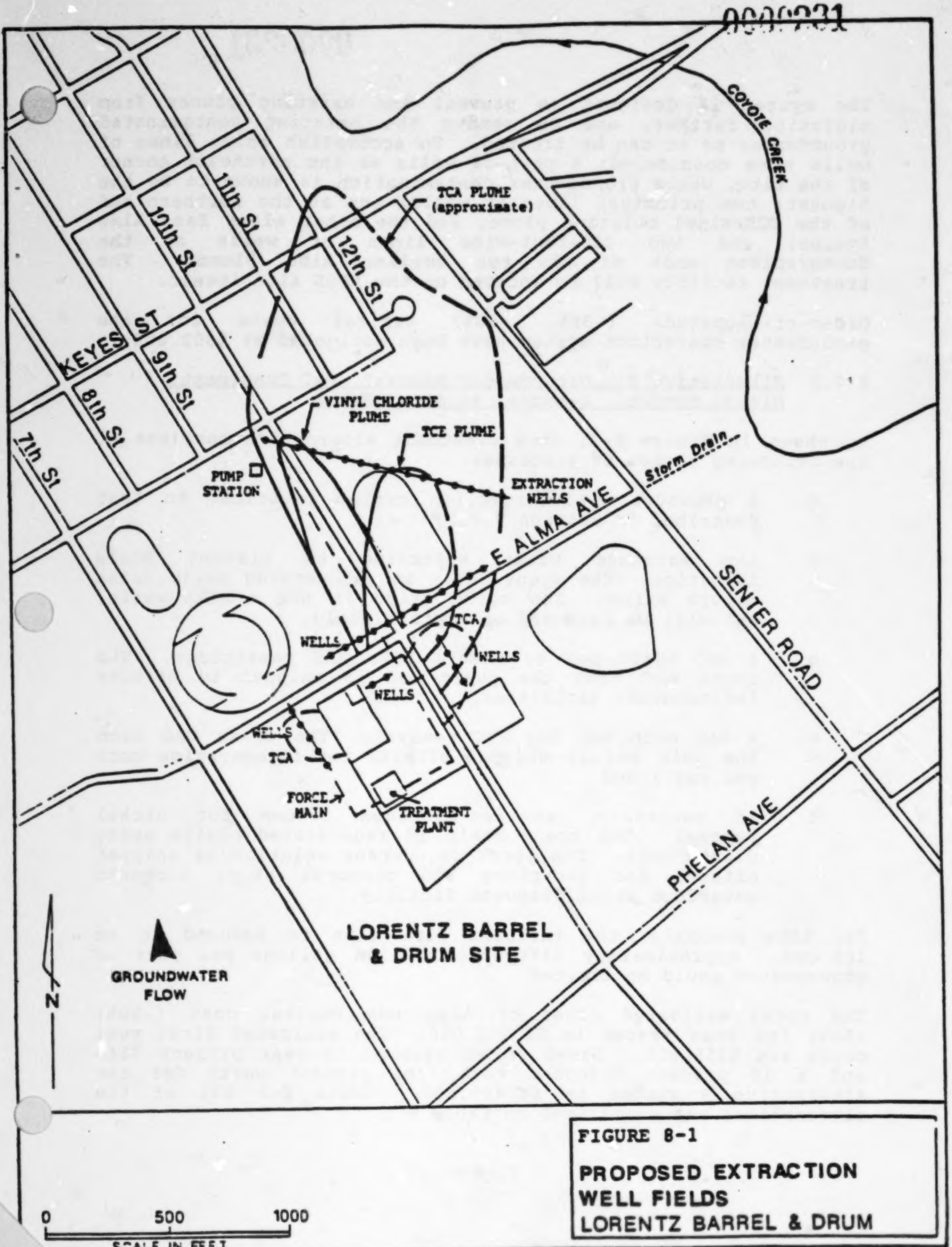

COYOTE CREEK
TCA PLUME (approximate)
11th St
10th St
12th St
KEYES ST
9th St
8th St
7th St
VINYL CHLORIDE PLUME
TCE PLUME
PUMP STATION
EXTRACTION WELLS
Storm Drain
E ALMA AVE
SENTER ROAD
TCA
WELLS
WELLS
WELLS
WELLS
TCA
FORCE MAIN
TREATMENT PLANT
PHELAN AVE
LORENTZ BARREL & DRUM SITE
GROUNDWATER FLOW
N
0
500
1000
SCALE IN FEET

FIGURE 8-1

PROPOSED EXTRACTION WELL FIELDS LORENTZ BARREL & DRUM

The system is designed to prevent the existing plumes from migrating further, and to remove the existing contaminated groundwater so it can be treated. To accomplish this, lines of wells were considered: a pair of wells at the northeast corner of the site, where groundwater contamination is known to be the highest; two principal lines of wells, one at the northern end of the TCE/vinyl chloride plume, and the other along East Alma Avenue; and two 200-foot-wide lines of wells at the downgradient ends of the two smaller side plumes. The treatment facility will be located on the LB&D site itself.

Order-of-magnitude (-30%, +50%) capital costs for the groundwater extraction system have been estimated at $803,000.

8.2.3 Alternative B: Groundwater Removal, GAC Treatment, Nickel Removal, Disposal to Storm Sewer

As shown in Figure 8-2, this treatment alternative consists of the following series of processes:

- a groundwater interception system identical to that described in Section 8.2.2;
- ion exchange water softening to prevent scale formation. The spent resin is regenerated daily using dilute brine. The spent brine is not a RCRA waste, but will be disposed of appropriately;
- a GAC guard bed to remove PCBs and pesticides. The spent GAC from the guard bed is shipped to offsite incineration facilities;
- a GAC main bed for VOC removal. The spent GAC from the main bed is shipped offsite for regeneration once per year; and
- if necessary, an ion-exchange column for nickel removal. The spent resin is regenerated onsite using dilute acid. The spent regenerant solution is shipped offsite for recycling and disposal at a licensed hazardous waste disposal facility.

For this analysis, the influent flow rate is assumed to be 100 gpm. Approximately fifty-two million gallons per year of groundwater would be treated.

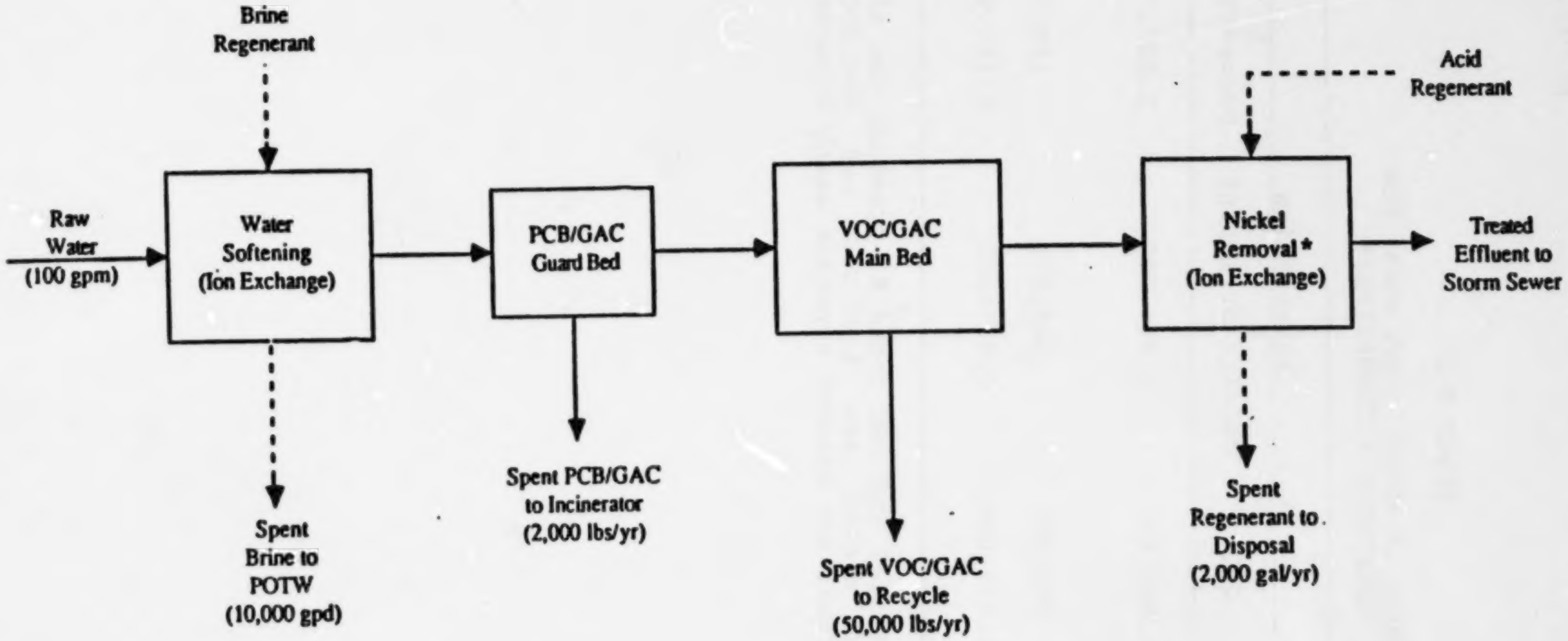
The total estimated order of magnitude capital cost (-30%; +50%) for this system is $1,902,000. The estimated first year costs are $255,000. Based on an assumed 10 year project life and a 10 percent discount rate, the present worth for the Alternative B system is $3,469,000. Costs for all of the alternatives are summarized on Table 8-3.

TABLE 8-3

SUMMARY OF COSTS (-30% +50%) FOR TREATMENT ALTERNATIVES*

	Alternative		
	B GAC	C GAC/Air Stripping	D Ozone-UV/GAC
Capital Costs	1,902,000	1,964,000	2,022,000
First Year Operation and Maintenance	255,000	243,000	198,000
Present Worth	3,469,000	3,457,000	3,238,000

* The estimated capital and O&M costs of treating the effluent for removal of nickel are $200,000 and $54,000/year, respectively. These are assumed constant among alternatives.


Raw
Water
(100 gpm)
Brine
Regenerant
Water
Softening
(Ion Exchange)
Spent
Brine to
POTW
(10,000 gpd)
PCB/GAC
Guard Bed
Spent PCB/GAC
to Incinerator
(2,000 lbs/yr)
VOC/GAC
Main Bed
Spent VOC/GAC
to Recycle
(50,000 lbs/yr)
Acid
Regenerant
Nickel
Removal *
(Ion Exchange)
Spent
Regenerant to
Disposal
(2,000 gal/yr)
Treated
Effluent to
Storm Sewer

* If necessary

Figure 8-2
Flow Diagram for Liquid-Phase GAC Treatment

8.2.4 Alternative C: Groundwater Removal, Air Stripping/GAC Treatment, Nickel Removal, Disposal to Storm Sewer

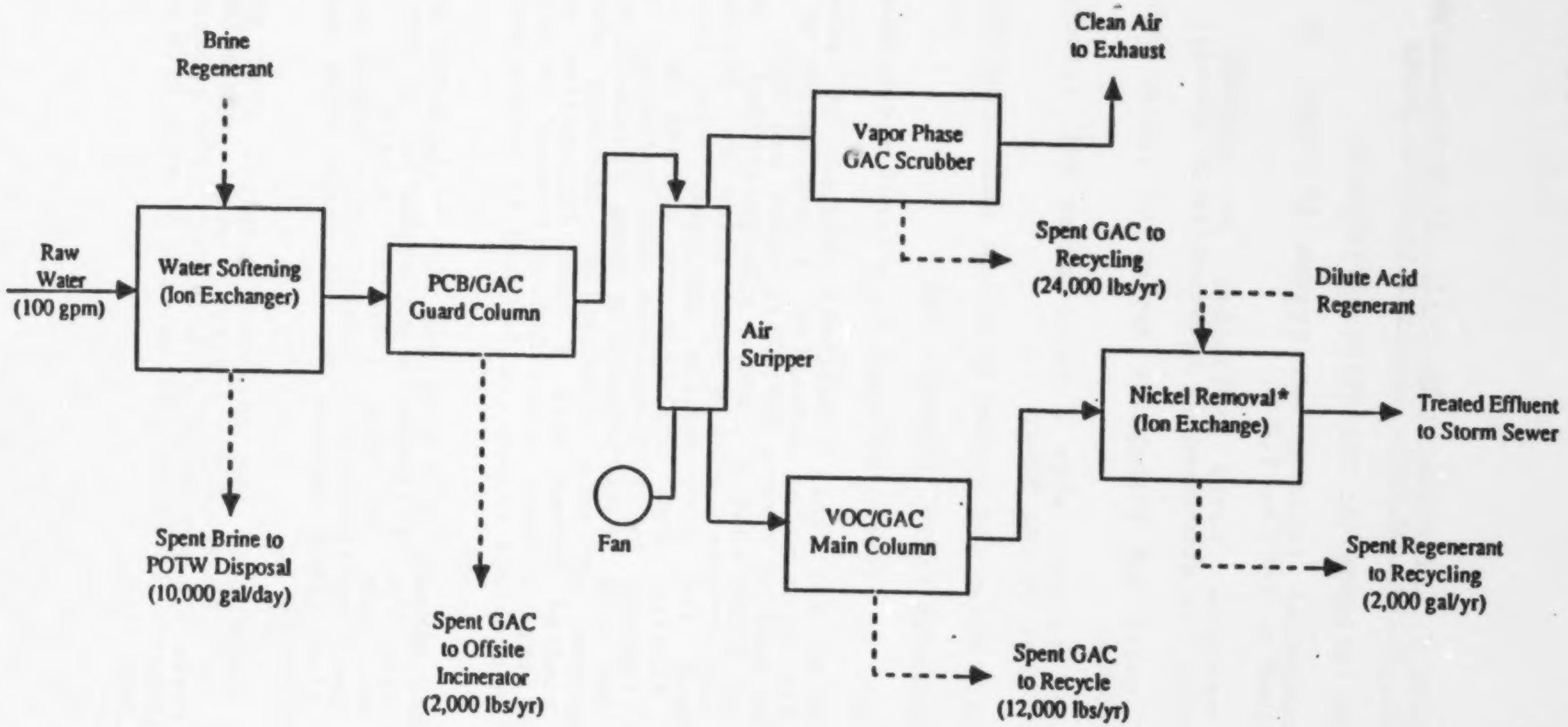
This alternative includes the following operations:

- a groundwater interception system identical to that described in Section 8.2.2;
- ion exchange water softening to prevent scale formation (as discussed in Alternative B, above);
- a GAC guard bed adsorption system to remove PCBs and pesticides;
- an air stripper with a vapor phase GAC scrubber to remove most of the VOCs;
- a liquid phase GAC system to remove unstripped VOCs;
- ion exchange nickel removal; and
- disposal of treated effluent to a local storm sewer.

The flow diagram for this treatment system is shown in Figure 8-3. Following water softening, a combination of three systems will be used to remove PCBs/Pesticides and VOCs. A GAC guard column is first used to remove PCBs/pesticides. Next, a packed tower air stripper with a vapor-phase GAC scrubber is used to remove the most easily stripped VOCs from the groundwater. Finally, VOCs that are not removed by the air stripper are removed by a downstream GAC polishing column. Although the May 1988 EE/CA identified fume incineration as a possible component of this alternative, recently completed treatability studies showed that a fume incinerator was not necessary, and that a vapor phase GAC unit would be adequate. Finally, an ion exchange column can be used to remove nickel if necessary.

The hydrocarbon exhaust rate from the air stripper/GAC scrubber will be less than the 15 lbs/day limit specified by the BAAQMD for total emissions of smog inducing substances in the atmosphere. These emissions will concurrently comply with the 10^{-6} cancer risk limit imposed by the Toxic Risk Screening Policy of the BAAQMD.

As shown in Table 8-3, the estimated capital cost for this alternative is $1,964,000. First year operation and maintenance costs are estimated at $243,000. The present worth of this alternative is $3,457,000 using a 10-year life and a 10 percent discount rate.


Brine Regenerant
Raw Water (100 gpm)
Water Softening (Ion Exchanger)
Spent Brine to POTW Disposal (10,000 gal/day)
PCB/GAC Guard Column
Spent GAC to Offsite Incinerator (2,000 lbs/yr)
Fan
Air Stripper
Vapor Phase GAC Scrubber
Clean Air to Exhaust
Spent GAC to Recycling (24,000 lbs/yr)
VOC/GAC Main Column
Spent GAC to Recycle (12,000 lbs/yr)
Dilute Acid Regenerant
Nickel Removal* (Ion Exchange)
Treated Effluent to Storm Sewer
Spent Regenerant to Recycling (2,000 gal/yr)

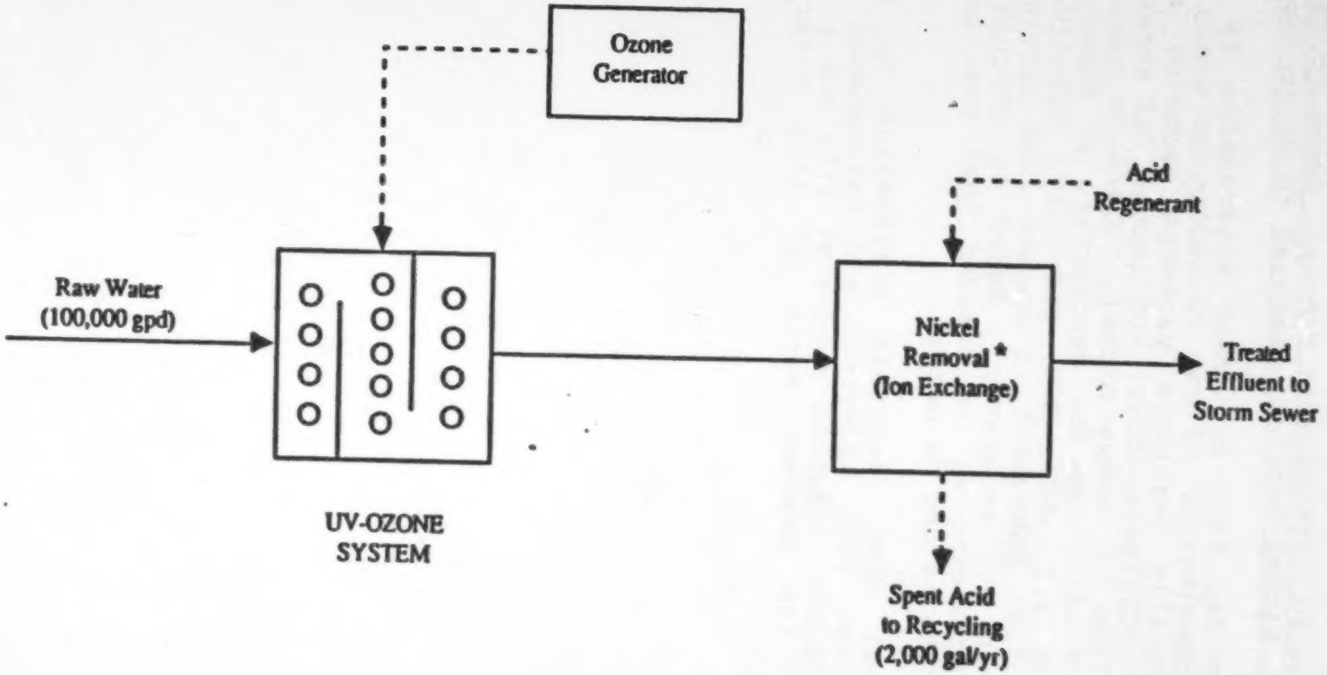
* If necessary

Figure 8-3
Flow Diagram for GAC/Air Stripping Treatment

8.2.5 Alternative D: Groundwater Removal, Ozone-UV/GAC Treatment, Nickel Removal, Disposal to Storm Sewer

The flow diagram for this treatment alternative is shown in Figure 8-4. A combination of two technologies would be used: first, a commercially available packaged ozone-UV system to destroy VOCs and PCBs/pesticides; and second (if necessary), an ion exchange column to remove nickel. Ozone-UV treatment has been shown to be effective for destruction of PCBs/pesticides and VOCs such as 1,1,1-TCA, TCE, and vinyl chloride. Also, treatability studies conducted in August 1988 determined that GAC polishing was not necessary. Based on discussions with equipment manufacturers, it is assumed that pretreatment for water softening should not be needed.

Estimated capital cost for this alternative is $2,022,000 (Table 8-3). First year operation and maintenance costs are estimated at $198,000. Assuming a 10-year life and a 10 percent discount rate, the present worth of this alternative is $3,238,000.


Ozone
Generator
Acid
Regenerant
Raw Water
(100,000 gpd)
UV-OZONE
SYSTEM
Nickel
Removal *
(Ion Exchange)
Treated
Effluent to
Storm Sewer
Spent Acid
to Recycling
(2,000 gal/yr)

* If necessary

Figure 8-4
Flow Diagram for Ozone/UV Treatment System

9.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

9.1 COMPARISON OF ENGINEERING EVALUATION/COST ANALYSIS AND FEASIBILITY STUDY GUIDANCE CRITERIA

The United States Environmental Protection Agency (EPA) guidance criteria for evaluating remedial alternatives for Engineering Evaluation and Cost Analysis (EE/CA) and Feasibility Studies (FS) are presented below for comparison.

FS Guidance Criteria

- Short-term effectiveness
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Implementability
- Cost
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)
- Overall protection of human health and environment
- State acceptance
- Community acceptance

EE/CA Criteria (non-time-critical)

- Technical feasibility
  - Effectiveness
  - Demonstrated performance
  - Operation and maintenance requirements
  - Useful life
  - Environmental effects upon operations
  - Constructability
- Reasonable cost
- Institutional considerations
  - Permitting and other factors affecting startup
  - Time to complete
  - Safety
- Environmental impacts

The major differences between the EE/CA guidance and the FS guidance are that there are no requirements to meet ARARs or to perform a Risk Assessment in the EE/CA. As shown above, the evaluation criteria are otherwise very similar. Since the Lorentz Barrel & Drum (LB&D) EE/CA included consideration of ARARs and provided preliminary risk assessments, the alternative actions have been evaluated by all of the FS criteria.

9.2 COMPARISON EVALUATION METHODOLOGY

The evaluation method used is based on the method under development by United States Environmental Protection Agency (EPA) as EE/CA guidance for non-time-critical removal actions. This method uses a set of criteria based on technical feasibility, cost reasonableness, institutional considerations, and environmental impacts. Table 9-1 presents the criteria and associated ratings.

TABLE 9-1

TECHNOLOGY SELECTION CRITERIA*

Criteria	Rating Points
1. TECHNICAL FEASIBILITY	
A. Effectiveness	
. Destroys hazardous substances	4
. Prevents release of hazardous substances; contaminants are isolated but not eliminated	3
. Minimizes the release of hazardous materials; adequately protects public health and environment	2
. Allows or promotes release of hazardous substances; ineffective.	1
B. Demonstrated Performance	
. Proven reliable in the field under similar conditions on the same waste materials; widely demonstrated to be effective	4
. Proven reliable in the field under similar conditions on similar waste materials	3
. Proven reliable, but under different conditions and materials; limited experience and reliability	2
C. Useful Life	
. Permanent; irreversible	4
. Long-term, potentially reversible; effectiveness decreases in time with a low probability of release	3
. Long-term, potentially reversible with a high probability for release	2
. Short-term solution; difficult to repair or replace upon failure; temporarily mitigates hazards; long term abilities questionable	1
D. . Environmental Effects Upon Operations	
. Performs well under all environmental conditions	4
. Performs well under most environmental conditions	3
. Performs adequately under most conditions	2
. Susceptible to adverse weather conditions	1

TABLE 9-1 (Continued)

TECHNOLOGY SELECTION CRITERIA*

Criteria	Rating Points
2. REASONABLE COST	
This item is discussed but not scored	
3. INSTITUTIONAL CONSIDERATIONS	
A. Permitting and Other Factors Affecting Start-up	
. No permitting or significant lead time required	4
. Minimal lead time required (3 months)	3
. Moderate lead time required (6 months)	2
. Significant lead time required (1 year)	1
B. Time to Complete	
. Can be completed within the 12-month statutory limit	4
. Site is expected to qualify for an exemption to the 12-month limit and an alternative can be completed within a reasonable time thereafter	3
. Site is expected to qualify for an exemption, but requires significant time beyond the 12-month limit to complete	2
. Cannot be completed within the 12-month statutory limit and the site is not expected to qualify for an exemption	1
C. Safety	
1) During Installation/Operation	
. Very safe; requires no more than normal safety procedures required for workers at hazardous waste sites; no threat to surroundings at any time	4
. Safe; requires few safety procedures other than those normally required at hazardous waste sites; minor threat to adjoining residential areas may occur	3
. Hazardous; requires stringent safety procedures to ensure worker safety; may	2

TABLE 9-1 (Continued)

TECHNOLOGY SELECTION CRITERIA*

Criteria	Rating Points
require evacuation of homes near the site	
. Very hazardous; requires remote operation and evacuation of area homes	1
2) Effects of Failure	
. Very safe; redundant controls prevent hazardous substance release	4
. Failure results in hazard that is less than that presented by the site prior to the removal action	3
. Failure results in hazard that is approximately equal to that presented by the site prior the removal action	2
. Failure results in hazard greater than that presented by the site prior to the removal action	1
D. Other relevant institutional considerations may be added	
4. ENVIRONMENTAL IMPACTS	
. Positive environmental impact	4
. No detrimental environmental impact	3
. Minimal adverse environmental impact	2
. Extreme adverse environmental impact	1

* Based on guidance from EPA for the EE/CA

9.3 COMPARISON OF ALTERNATIVES

Staff from EPA and Ebasco met on August 30, 1988 to discuss the alternatives and select one for implementation. During that meeting, GAC and ozone/UV treatability test results of July and August 1988 were presented by the respective vendors. The results of those tests indicate that action levels can be achieved by either technology. Consequently, none of the alternatives was eliminated based solely on ability to treat groundwater to desired levels.

An evaluation similar to that presented in section 6 of the EE/CA was performed. This evaluation assessed each alternative in light of the EE/CA evaluation criteria. The results are presented in Table 9-2. All of the treatment alternatives were scored essentially equal. Present worth estimates are also approximately the same, within the accuracy of the estimates that were prepared.

Three primary distinctions can be made among the alternatives however. These are:

- GAC systems have been proven reliable over a longer time period than the ozone/UV system;
- the ozone/UV system provides onsite destruction of contaminants, as opposed to transporting wastes for offsite destruction of contaminants through regeneration of the carbon; and
- GAC/air stripping could require additional air emission controls in order to comply with BAAQMD standards.

Two other water treatment considerations were identified during the treatability testing. One involved influent treatment; the other involved possible effluent treatment. The GAC testing revealed a carbonate precipitate in the test column. As a result, it was recommended that a water softening step be included prior to the GAC options. The ozone/UV system did not experience scaling during the treatability testing. Both processes require further consideration of effluent concentrations of nickel as well. This issue will be examined through additional groundwater sampling and analyses, and bioassays of treated effluent. If results of these studies show that nickel removal is necessary, a treatment system such as that described in Section 8.2.3 will be included in the process prior to discharge of the effluent.

In consideration of all of the factors, EPA has decided that the best course of action is to demonstrate the ozone/UV

TABLE 9-2
COMPARISON OF ALTERNATIVES

	Alternative A No Action	Alternative B Liquid Phase GAC	Alternative C GAC/Air Stripping/ Vapor Control	Alternative D Ozone-UV
Technical Feasibility				
. Effectiveness	1	3	3	4
. Demonstrated Performance	1	4	4	3
. Useful Life	1	3	3	3
. Environmental Effects on Performance	1	4	4	4
Subtotal Score	4	14	14	14
Institutional Considerations				
. Permitting and Startup	2	4	3	4
. Time to Complete	2	4	4	4
. Safety	2	4	4	4
Subtotal Score	6	12	11	12
Environmental Impacts	1	4	4	4
TOTAL SCORE	11	30	29	30
Estimated Costs				
. Capital Cost	*	1,902,000	1,964,000	2,022,000
. First Year Operation and Maintenance	*	255,000	243,000	198,000
. Present Worth Costs	$170,000	3,469,000	3,457,000	3,238,000

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*These costs will depend on:

- the number of monitoring wells;
- the frequency of monitoring; and
- which chemical analyses are chosen.

technology through the Superfund Innovative Technologies Evaluation (SITE) program. This selection was made for the following reasons:

- o the technology provides onsite destruction of contaminants;
- o a several week(s) demonstration will allow EPA to determine the reliability of the ozone/UV system;
- o it appears that ozone/UV may not require water softening. However, the demonstration will allow EPA to determine whether an eventual carbonate scaling problem can be dealt with through pH adjustment rather than water softening;
- o there will be no long-term commitment of taxpayer dollars until the testing program conclusively demonstrates the success of the technology; and
- o should ozone/UV not prove adequate based on further testing, Alternative B (Liquid Phase GAC) provides an adequate backup remedy.

EPA's selected remedy is described in detail in Section 10.0.

9.4 TREATED EFFLUENT DISPOSAL

Of the four treated effluent disposal options, only two are technically and administratively feasible: discharge to the storm sewer and Coyote Creek; and groundwater recharge by reinjection wells. Each of the four options are described below.

Storm Sewer/Coyote Creek - This is the least expensive and most reliable option. It would only require that a force main be constructed to the nearest storm drain. The California Regional Water Quality Control Board (CRWQCB) discharge requirements for surface water disposal would have to be satisfied.

Groundwater Reinjection - This option is feasible. Effluent disposal would be performed by pumping the treated effluent back into the shallow aquifer, using a series of reinjection wells. Because of the need for extra wells and pumps, this option would be expensive and more subject to mechanical problems than would the "storm sewer" option. The pretreatment standards established by the CRWQCB would have to be satisfied. As an alternative to using reinjection wells, there are currently several large municipal groundwater recharge basins within a few miles of the LB&D site. The LB&D effluent could conceivably be pumped off site to one of those facilities. However, this would be impractical because it would require construction of miles of force main through residential areas.

Publicly Owned Treatment Works (POTW) Sanitary Sewer - This option is not feasible. Discharge of any groundwater, pretreated or not, to the POTW sanitary sewer is forbidden by the San Jose Municipal Code Ordinance #20710, Title 15, Section 15.12.200.

Industrial Reuse - This option is technically feasible but it would be expensive and impractical. The treated effluent could conceivably be stored and used by local industries for process water. However, it would require construction of large storage tanks and complex water distribution piping systems. This option would not be practical, since there are no industries near the LB&D site that require a large, steady volume of process water. The disposal of the LB&D effluent would therefore be limited by the fluctuating water needs of many small businesses.

In summary, the most practical and least expensive alternative for treated effluent disposal during the Expedited Response Action (ERA)/Operable Unit is disposal to the storm sewer/Coyote Creek. Industrial reuse and groundwater injection will be studied in more detail during the Feasibility Study. Any of these options could be selected as a long-term solution to the disposal question.

10.0 THE SELECTED REMEDY

The selected remedy consists of the following items: a groundwater extraction system; an above-ground treatment system (ozone/UV plus nickel removal); and treated effluent disposal to the storm sewer. As mentioned in Section 8.2, until a final decision is reached between EPA and CRWQCB concerning appropriate effluent limitations for nickel, it is assumed that NPDES discharge limits will require nickel removal. Each of these items are described in the following sections.

The selected remedy was chosen for the following reasons:

- the contaminated shallow groundwater will be contained and removed, thereby minimizing the potential for future contamination of deeper drinking water aquifers;
- the ozone/UV treatment system will treat all VOCs to below the MCLs and NPDES discharge limits, and will treat PCBs/pesticides to below detectable levels;
- as discussed in Chapter 9.0, the ozone/UV treatment system received the highest overall rating among the alternatives, and has the lowest estimated present worth cost; and
- the ozone/UV treatment system can be field tested for reliability under EPA's Superfund Innovative Technology Evaluation (SITE) program.

As discussed in Section 8.2.2, the groundwater plume will be intercepted and collected using the extraction system shown in Figure 8-1.

As shown in Figure 8-4, a combination of two technologies would be used: First, a commercially available packaged ozone/UV system to destroy VOCs and PCBs/pesticides; and second, an ion exchange treatment system to remove nickel. Ozone/UV treatment has been shown to be effective for destruction of PCBs/pesticides and halogenated hydrocarbons such as 1,1,1-TCA, TCE, and vinyl chloride.

EPA and other agencies have supported a variety of tests, which have shown that ozone/UV treatment is effective for permanent destruction of VOCs and PCBs/pesticides in wastewater and groundwater. Treatability tests using LB&D groundwater were performed in July and August 1988. These tests showed that VOCs could be destroyed to below the NPDES discharge limits. In 1980, at a General Electric plant in Hudson Falls, New York, a commercial ozone/UV treatment plant was installed and successfully operated to destroy PCBs in groundwater to below detection levels.

The contaminated groundwater will initially be pumped to an equalization tank. This tank will provide roughly 30 minutes of storage and will dampen any short-term variations in flow rates or contaminant concentrations. A commercially-available packaged ozone/UV treatment system will be used to destroy PCBs/pesticides and other organic compounds. The ozone/UV treatment method utilizes ozone's strong oxidizing capacity with UV light's additional energy to provide considerable amounts of free radicals and excited-state species capable of effectively destroying the contaminants present.

Ozone is provided by an onsite generator and bubbled through the wastewater. The ozonated wastewater is then subjected to high intensity UV light in a packaged treatment vessel. The UV light originates from an array of quartz-enclosed low-pressure mercury lamps. It is assumed that ozone/UV treatment will destroy the PCBs/pesticides, vinyl chloride, 1,1,1-TCA, and TCE in the influents. The residence time of the water in the ozone/UV unit is 40 minutes. The wastewater is treated using an oxidant dosage of 75 mg/l of ozone plus 25 mg/l of hydrogen peroxide. Contaminant destruction occurs inside the treatment vessel.

EPA will be working with CRWQCB to determine NPDES limits for nickel. If necessary, nickel can be removed using a packaged, commercially available ion exchange system. Additional treatability studies will be required to select the best ion exchange resin. Based on discussions with resin manufacturers, the resin will be contained in conventional columns. The spent resin will be regenerated several times each year, using dilute acid as the regenerant solution, and will consist of a neutralized nickel sulfate solution. The spent solutions will be shipped to an offsite recycling firm if further data suggest that economical recovery of the nickel sulfate is possible. If not, the waste will be disposed of in accordance with existing solid and hazardous waste legislation.

The ozone/UV system will be delivered prepackaged and installed skid-mounted. The ozone/UV treatment system, the nickel removal columns, and all required pumps and controls will be housed in a prefabricated building. The treatment plant site will be fenced to prevent public access.

The estimated capital and operating costs for the extraction and treatment systems are listed in Table 10-1. The capital costs for the groundwater extraction system are based on Ebasco engineering estimates. The capital and operating costs for the treatment system are based on manufacturers' estimates.

TABLE 10-1

ESTIMATED (-30%, +50%) COSTS FOR OZONE/UV TREATMENT ALTERNATIVE

Capital Costs

1/Direct	Site preparation	$10,000
	Groundwater extraction system	803,000
	Flow equalization	5,000
	Ozone/UV equipment	300,000
	Nickel removal system	200,000
	Levels, controls (etc.)	20,000
	Building	80,000
	Disposal force main	5,000
		$1,423,000
2/Indirect	NPDES Permit application	30,000
	Engineering Construction Management (15% Direct costs)	213,000
	Contingency (25% Direct Costs)	356,000
		$599,000
	Total estimated Capital Costs	$2,022,000

O&M Costs (Annual)

Operating labor (2 days/week @ $300/day)	$31,000
Ozone power/year ($0.263/1000 gals)	14,000
Hydrogen Peroxide/year ($0.125/1000 gals)	7,000
Ultraviolet power/year ($0.266/1000 gals)	14,000
Ultraviolet maintenance (including lamp replacement and labor)	16,610
Replacement of Nickel removal resin ($100,000/2 years)	50,000

TABLE 10-1 (Continued)

ESTIMATED (-30%, +50%) COSTS FOR OZONE/UV TREATMENT ALTERNATIVE

O&M Costs (Annual) (Continued)

Processing of spent resin reactivation solution ($2/gal, 2000 gals/year)	4,000
Treated effluents analysis (1/week @$300)	16,000
Groundwater sampling (40 wells/year $2,500/well)	20,000
System maintenance (5% O_3/UV and Nickel removal equipment Capital Costs)	25,000
	$198,000
Present Worth (i = 10%, 10 yrs)	$3,238,000

The estimated capital cost for the selected remedy is $2,022,000. The estimated first year operating cost is $198,000. The estimated present worth cost (assuming a 10 year project life and a 10 percent discount) is $3,238,000.

Treated effluent will be disposed of by pumping directly to the nearest storm sewer. The treated effluent will satisfy all of the required NPDES discharge standards. It is assumed that periodic monitoring will be required to document compliance with the pretreatment standards.

11.0 STATUTORY DETERMINATIONS

The statutory requirements of Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) state that the selected remedy must:

- be protective of human health and the environment;
- attain Applicable or Relevant and Appropriate Requirements (ARARs);
- be cost-effective;
- utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent possible; and
- address whether the preference for treatment that reduces toxicity, mobility, or volume as a principal element is satisfied.

11.1 PROTECTIVENESS OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy is protective of human health and the environment by preventing further vertical or horizontal migration of contaminants in the shallow aquifer and treating the extracted groundwater prior to disposal. It also prevents migration of contamination into the deeper drinking water aquifer and Coyote Creek. By stopping the migration of contaminants and treating the extracted groundwater, the selected remedy reduces the potential threats posed by contamination of Coyote Creek and the drinking water aquifer.

11.2 ATTAINMENT OF ARARS

The selected remedy will meet all substantive ARARs for the shallow groundwater, as discussed in Section 8.1.

The numerical limits that apply to the shallow groundwater are specified on Table 8-2. The results of the treatability study will demonstrate that this remedy achieves those action limits.

11.3 COST EFFECTIVENESS

All of the treatment alternatives are essentially equal with respect to total present worth costs. No distinction can be made among these alternatives from the cost point of view within the accuracy of the estimates that were prepared. All treatment alternatives are therefore equally cost effective.

The selected approach, which is to perform a demonstration of ozone/UV through the SITE program, is especially cost effective. It defers capital expenditures until the technology is demonstrated over a reasonably long term. Such an approach reduces the ultimate risk borne by the taxpayer by increasing the level of knowledge about this technology at the LB&D site.

11.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The selected remedy meets the Superfund Amendment and Reauthorization Act of 1986 (SARA) preference for permanent solutions to the maximum extent practicable. It is expected to remove the contaminants from the groundwater and to effectively destroy them or convert them into harmless substances posing no threat to human health and the environment.

11.5 PREFERENCE FOR TREATMENT THAT REDUCES TOXICITY, MOBILITY, AND VOLUME AS A PRINCIPAL ELEMENT

The selected remedy focuses on treatment of the contaminated shallow groundwater to specified action levels. This treatment technology is expected to reduce the toxicity of the contaminants by rendering them harmless. Mobility is reduced by use of the selected groundwater extraction system, preventing the further spread of the plumes. Also, by extracting and treating the shallow groundwater, it is likely that the volumes of the plumes will be reduced.

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LORENTZ BARREL & DRUM
ENGINEERING EVALUATION/COST ANALYSIS
RECORD OF DECISION

PART 3

RESPONSIVENESS SUMMARY

1.0 INTRODUCTION

From June 1, 1988 through June 30, 1988, the United States Environmental Protection Agency (EPA) sponsored a public comment period on EPA's Draft Engineering Evaluation and Cost Analysis (EE/CA) for the shallow groundwater contamination at the Lorentz Barrel & Drum (LB&D) Superfund site in San Jose, California. Region IX has determined that the EE/CA is substantively equivalent to a fast track operable unit feasibility study. The EE/CA evaluates four alternatives for addressing shallow groundwater contamination at the LB&D site. Each alternative contains a component for the removal and treatment of the contaminated groundwater, which lies approximately 40 feet below the ground surface, and the disposal of the treated water. The purpose of the public comment period was to give interested parties the opportunity to comment on the EE/CA.

The EE/CA is a study that examines various ways that the contamination problem in the shallow aquifer can be addressed while a remedy for the remainder of the site is being developed. The purpose of the EE/CA is to select a remedy for the shallow groundwater contamination that is protective of human health and the environment, attains Federal and state Applicable or Relevant and Appropriate Requirements (ARARs), and is cost-effective. Because the full extent of the contamination at the LB&D site is not yet known, EPA has chosen to accelerate the remediation process by addressing the shallow groundwater contamination as a separate unit. Remedial alternatives for the other contaminated media at the site will be examined in a separate site Feasibility Study (FS) Report, which will be issued in late 1989.

A Responsiveness Summary is required under EPA Superfund regulations for the purpose of providing both EPA and the interested public with a review and summary of community concerns about the site and comments on the EE/CA. In addition to summarizing citizen concerns and questions, the Responsiveness Summary presents EPA's responses to those concerns.

The Responsiveness Summary for the EE/CA conducted at the LB&D site is divided into three sections:

Background on Community Involvement and Concerns. This section provides a brief history of community interest in and concerns about the LB&D site.

Overview of the LB&D EE/CA. This section provides a brief history of the LB&D site, summarizes the contents of the Draft EE/CA, and identifies EPAs preferred alternatives.

Summary of Comments Received and EPA Responses. This section categorizes and summarizes written and oral comments received during the public comment period and provides EPA's responses to these comments.

Appendix A contains an index and copies of the pages from the public hearing transcript that contain the specific comments made.

2.0 BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The Lorentz Barrel & Drum (LB&D) site, one of the many sites in the South San Francisco Bay area affected by groundwater contamination, has been highly visible in the local press and among citizens living in the vicinity of the site since a contamination problem was identified in 1980. Concerns have been registered with the California Regional Water Quality Control Board (CRWQCB), City Council representatives and other local agencies on a regular basis, and indicate that the community has been concerned primarily with the potential effects of the shallow groundwater contamination on its drinking water.

Moreover, residents of the area for the most part have not distinguished between the shallow and deeper aquifers. They believe that contamination at any level would affect the safety of their drinking water supply. Agency representatives have sought to assure residents that the deeper aquifer supplies residents with their drinking water and that, to date, there is no evidence to indicate contamination in the deeper aquifers.

Between 1980, when California Division of Occupational Safety and Health (OSHA) informed the California Department of Health Services (DHS) of potential hazardous material problems at the LB&D site, and 1987, when technical progress initiated more contact between the agencies and community members, few community relations activities were conducted at the site. However, investigations, sampling efforts, and remedial actions were conducted jointly by DHS, the CRWQCB, and the United States Environmental Protection Agency (EPA) when the responsible party refused to comply with cleanup regulations. As a result of the multi-agency participation during this time, some community members raised the concern that the responsibility for problems at the site had been shifted among the agencies so much that no one agency had been exercising adequate leadership.

In 1987, community involvement increased significantly when DHS released a Preliminary Site Assessment for public review, held an agency briefing to present a status report on the LB&D site investigations, published a series of fact sheets and updates detailing technical progress at the site, and drafted a Community Relations Plan (CRP) for the site. The CRP is based on interviews conducted by the DHS with community members, elected officials, and agency representatives. It summarizes past community concerns and discusses current and potential issues in the community related to the site.

In June 1987, DHS held a public meeting to provide the community with information regarding the site investigation and Preliminary Site Assessment Report. Over 100 community members attended the meeting. Several attendees expressed dissatisfaction with the length of time that the agency was taking to investigate and cleanup the site. They also expressed their concerns about the status of the drinking water in the area and the effects that water might have on fruit and vegetable gardens near the site. On September 3, 1987, DHS held another public meeting (with roughly 100 attendees) to discuss the proposed actions for drum and sump removal. The public expressed dissatisfaction with the format of the meeting, claiming that it did not provide an appropriate forum for public involvement. In response to this concern, DHS hosted an informal community open house on November 18, 1987 to answer community questions, especially those related to health issues.

On December 1, 1987, EPA was designated as the lead agency responsible for site investigation and cleanup. DHS and EPA distributed a joint fact sheet in February informing the public that responsibility for the site had been transferred. On February 25, 1988, a public meeting was held to discuss the changes in responsibility for the site cleanup. Approximately 25 people attended this meeting.

Since EPA became involved at the site, it has conducted a Limited Sampling Program, taking soil and water samples from private fruit gardens, community gardens, a local grocery store, and nearby Coyote Creek. EPA prepared and distributed a fact sheet in June 1988 explaining the Engineering Evaluation and Cost Analysis (EE/CA) and detailing the remedial alternatives proposed for the shallow groundwater contamination problem. A public meeting, attended by roughly 30 people, was held on June 15, 1988 to discuss the proposed remedial alternatives and to give community members an opportunity to comment formally on these alternatives. Results from the produce and creek sampling and a presentation of opportunities for community involvement also were presented. A few community members at the meeting stated that they were generally pleased with EPA's approach to community relations activities at the site.

The following list summarizes concerns raised during interviews conducted in DHS's preparation of the April 1987 CRP and in community meetings.

o Groundwater Quality - The primary concern at the LB&D site is the quality of the groundwater supply and the potential for contamination to move to the deeper aquifers, which supply residents with a portion of their drinking water. Many residents fear the potential short- and long-term health effects from contamination. Some community members fear the possibility of contamination spreading to food products, because some of the active wells serve food processing facilities. Other residents living near the site have expressed concern about the potential for contamination to affect private fruit and vegetable gardens, as well as public gardens. Residents also have expressed concern that inactive wells could allow contaminants to leach into the deeper aquifer. Some community members affiliated with San Jose State University are concerned about the effects of the contamination on a University recreational area. Drinking water for the recreational facility is provided by a university owned well which is screened in the deeper drinking water aquifer below 200 feet and located within 1 mile of the site.

- Need for Frequent Monitoring - Some community members believe that frequent groundwater monitoring is necessary to characterize the extent of contamination at the site accurately. These individuals believe that frequent monitoring would enable EPA to identify the spread of the contamination plume in a timely manner.

- Duration of Investigation - Some citizens criticized the government agencies for spending too much time and money on investigations without achieving any tangible results.

- Inefficiency of Agency Involvement - Prior to the increase in community relations efforts in 1987, some community members expressed frustration that their concerns regarding the safety of drinking water near the site had not been adequately addressed by the agencies involved. Local media attention emphasized the extent of the problem and minimized discussion about agency activity.

The San Jose Mercury News and the Spartan Daily, the San Jose State University newspaper, have presented most of the coverage on the shallow groundwater contamination at the LB&D site. Generally, the level of media coverage has corresponded to technical progress made at the site and the occurrence of public meetings and agency briefings. Media coverage concerning the site was particularly active during August 1987, as a result of the death of Mr. Ernest Lorentz, owner of LB&D, who had been placed in custody by the Santa Clara County District Attorney for his refusal to comply with cleanup requirements of the site.

The following is a list of community relations activities conducted to date by DHS and EPA at the LB&D Superfund site.

February 10, 1987	DHS presents status report on site investigation at an agency briefing. Those present included representatives from: EPA, DHS, Santa Clara County Health Department, Santa Clara County Executive's Office, Santa Clara Valley Water District, Bay Area Air Quality Management District (BAAQMD), San Jose City Manager's Office, San Jose Attorney's Office, San Jose Planning Department, San Jose Office of Environmental Management, and the San Jose Fire Department.
April 1987	DHS drafts CRP based on interviews that DHS conducted with community members and agency representatives regarding activities at the site.
June 1987	DHS distributes the first fact sheet explaining technical progress and the February 1987 release of the Preliminary Site Assessment Report.
June 24, 1987	DHS holds a public meeting to explain the Preliminary Site Assessment Report and technical progress made at the site to date.
August 1987	DHS distributes an update explaining the planned removal actions at the site.
September 3, 1987	DHS holds a public meeting to discuss the proposed removal actions.
October 1987	DHS distributes an update on the proposed transportation route for the removal actions.
November 1987	DHS distributes an update informing the public that EPA will be taking the lead as the agency responsible for further investigation and cleanup.
November 18, 1987	DHS holds an open house/public forum for community members to question or comment on activities at the site.
December 1, 1987	EPA becomes the lead agency responsible for site investigation and cleanup.

February 1988	EPA and DHS publish a joint fact sheet that explains the transfer of agency responsibility. The fact sheet also explains EPA's plan to pave most of the site to prevent surface water runoff and leaching.
February 25, 1988	EPA and DHS hold a public meeting to explain the transfer of lead agency, EPA's role in the Superfund process, recent paving activities, and EPA's plans for further activities.
March 1988	EPA distributes letters to some residents requesting permission to sample private fruit and vegetable gardens.
May 1988	EPA conducts Limited Sampling Program testing water and soil samples from private gardens, community gardens, and Coyote Creek.
June 1988	EPA distributes a fact sheet summarizing the EE/CA for shallow groundwater contamination.
June 15, 1988	EPA holds a community meeting to discuss the EE/CA and EPA's proposed cleanup solution, and to accept public comments on the proposed alternatives.
June 30, 1988	EPA conducts municipal well sampling program testing water from area drinking water wells.

3.0 OVERVIEW OF THE LORENTZ BARREL & DRUM ENGINEERING EVALUATION AND COST ANALYSIS

The contemplated Expedited Response Action (ERA)/Operable Unit is a shallow groundwater collection and treatment system. The objective of the Engineering Evaluation and Cost Analysis (EE/CA) was to consider various potential removal action options for this system, screen them, evaluate specific options in greater detail, and compare those that appear to offer the greatest benefits. Figure 3-1 diagrams the general EE/CA process.

In the EE/CA, the potential technologies under consideration were judged on their ability to achieve compliance with identified clean-up standards. The San Jose publicly-owned treatment works (POTW) acceptance criteria were also included in the action-specific review. The situation-specific nature of the threat was reviewed to evaluate whether the need to protect public health and the environment required more stringent requirements than the ARAR's.

The EE/CA first reviewed the site characterization. After formulation of removal action objectives which arose from review of the site characterization, various technologies were considered and initially screened against the prescribed ERA evaluation criteria. The screened technologies that survived were used to develop various ERA alternatives as combinations of technologies. These alternatives were evaluated, additional data requirements were identified, and a limited sensitivity analysis was performed as part of the comparison of implementation costs for the alternatives.

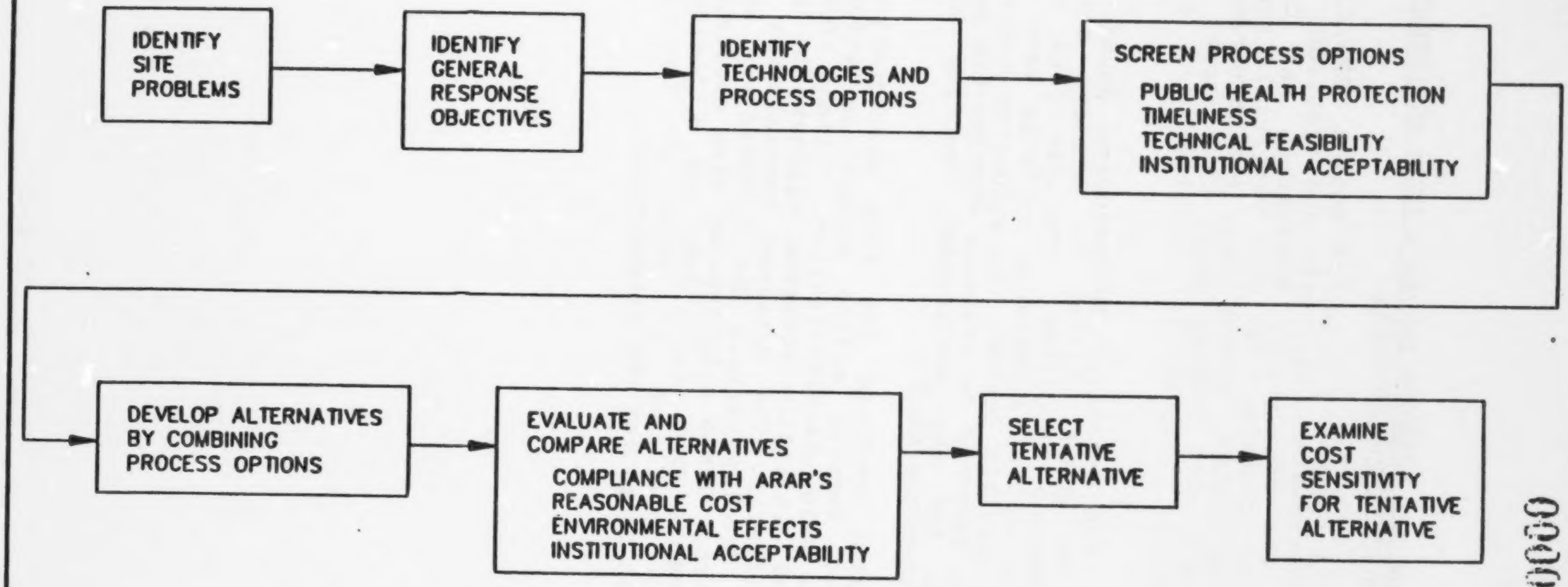
IDENTIFY SITE PROBLEMS
IDENTIFY GENERAL RESPONSE OBJECTIVES
IDENTIFY TECHNOLOGIES AND PROCESS OPTIONS
SCREEN PROCESS OPTIONS
PUBLIC HEALTH PROTECTION
TIMELINESS
TECHNICAL FEASIBILITY
INSTITUTIONAL ACCEPTABILITY
DEVELOP ALTERNATIVES BY COMBINING PROCESS OPTIONS
EVALUATE AND COMPARE ALTERNATIVES
COMPLIANCE WITH ARAR'S
REASONABLE COST
ENVIRONMENTAL EFFECTS
INSTITUTIONAL ACCEPTABILITY
SELECT TENTATIVE ALTERNATIVE
EXAMINE COST SENSITIVITY FOR TENTATIVE ALTERNATIVE

FIGURE 3-1
ENGINEERING EVALUATION/COST ANALYSIS PROCESS
LORENTZ BARREL & DRUM

4.0 SUMMARY OF COMMENTS RECEIVED AND THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY RESPONSES

4.1 COMMENTS FROM THE JUNE 15, 1988 PUBLIC MEETING

1. Comment:

One community member asked whether, after the water is treated, and assuming that the flow rates are sufficiently low, evaporation could be considered as a disposal alternative. [10]

United States Environmental Protection Agency (EPA) Response:

The assumed flows for the Expedited Response Action (ERA)/Operable Unit (100 gallons per minute (gpm)) are too large for effective use of an evaporation pond. The required amounts of land are not available in the site vicinity. As a result, evaporation ponds were not considered viable for the ERA. During the Remedial Investigation (RI) and the operation of the ERA groundwater extraction system, more information on groundwater flows and potential pumping rates will be developed. Evaporation ponds will be considered in the Feasibility Study (FS) as a long-term disposal option.

2. Comment:

Another community member, referring to the potentially large-scale plumbing effort necessary to transport contaminated water from the wells to the treatment plant, asked whether the construction activity could be kept to a level that would be tolerable to the neighborhood. [11]

EPA Response:

The piping associated with the extraction well system will be similar to that for a local water supply system. Construction of the required pipelines will involve digging 5-foot trenches at appropriate locations. As with any public works construction project, it will be planned to minimize disturbance in the residential areas. After this temporary disturbance, the water transmission system will be hidden from view.

3. Comment:

A representative of the Silicon Valley Toxics Coalition asked what cleanup goals EPA was following in its evaluation of cleanup technologies, and urged EPA to consider an approach that combines the California Regional Water Quality Control Board's (CRWQCB) policy of "nondegradation" with the "best available technology" approach. He also asked that, if EPA does a comparative cost estimate on these approaches the community be allowed to comment on those results. [12]

EPA Response:

Prior to discharge, the groundwater will be treated to meet the most stringent of any of the applicable regulations. The treatment system incorporates the "best available technology" for removal of organic compounds and trace metals. The CRWQCB requires that the treated effluent contain no detectable pesticides or PCBs. The CRWQCB discharge limits are designed to ensure that the treated effluent will cause no degradation of Coyote Creek.

4. Comment:

That same commenter, referring to the air stripping/ fume incinerator alternative, asked that EPA use the best available technology guidelines to treat the air emissions from the fume incinerator. He also suggested that the level of treatment attained by incineration should exceed the guidelines set by the Air Board. [13]

EPA Response:

As described in Section 6.0 of the Decision Summary, the risk presented by the air emissions from the air stripper is the result of the volatile organic hydrocarbons (VOCs) stripped from the groundwater. There are two ways to remove these compounds from the air: fume incineration; or granular activated carbon (GAC). However, EPA is concerned about GAC's effectiveness in removing vinyl chloride. As a result, gas-fired incineration was tentatively selected as the Best Available Technology for reducing these emissions. As stated in Section 6.0 (and presented in more detail in Section 5.4.3 of the

EE/CA), the Bay Area Air Quality Management District (BAAQMD) has set a criterion of an allowable cancer risk of 1×10^{-6}. The calculated risk from the uncontrolled emissions (before use of the fume incinerator) is 2.8×10^{-6}, which is only slightly above the BAAQMD limit of 1.0×10^{-6}. The destruction efficiency of a fume incinerator could reduce the cancer risk well below the BAAQMD guidelines. However since the EE/CA was written, the effectiveness of GAC for removal of VOC vapors has been evaluated by treatability tests during the summer of 1988. Results of these studies indicated that GAC would effectively remove VOC vapors to below BAAQMD limits, thus rendering use of a fume incinerator unnecessary.

5. Comment:

The community group representative also asked whether EPA could consider reinjection of the water into the shallow aquifer as an alternative to disposal. [14]

EPA Response:

A discussion of the groundwater reinjection option, as it compares with other disposal options, is presented in Section 9.4 of the Decision Summary. There are several different ways to reinject the treated effluents. For example, it could be reinjected either upstream or downstream of the contaminated zone. Each different method has its own advantages and disadvantages. Groundwater reinjection, as well as the effects of extraction on the shallow aquifer, will be evaluated in detail during the RI/FS process. Based on the current level of knowledge and cost considerations, it was not selected for the ERA. It may or may not be selected for the long-term remedial action chosen as a result of the RI/FS.

6. Comment:

One community member asked if tests had been conducted to determine whether contaminated groundwater is rising to the surface and evaporating off, which, she said, would be potentially harmful to people who use the track and tennis courts on a regular basis. She also asked what kind of tests had been conducted west of the designated plume. [15]

EPA Response:

Soil gas sampling has been performed on site in a westerly direction, and was used to define the boundary of the small western TCA plume. (See Figure 5-3 of the Decision Summary.) Additionally, the health risk assessment to be performed during the RI/FS process will evaluate the vapor inhalation pathway for exposure to humans. This assessment will model volatilization from the plume and diffusion through the soil and into the atmosphere. It will then evaluate the predicted ambient concentrations of chemicals in light of known or expected vapor inhalation risks. The objective of this study is to estimate risks associated with this potential pathway before and during implementation of remedial actions. Results of this evaluation will be made available to the public during the RI/FS.

7. Comment:

One community member asked which government body is responsible for recovering costs from those potentially responsible parties who sent drums to the Lorentz Barrel & Drum (LB&D) site. [16] He asked whether EPA knew the names of these companies and whether, if they were contacted, the companies had been willing to inform EPA of the contents of the barrels. [16] He also asked whether the tags attached to the barrels provided any information on the barrels' contents. [17]

EPA Response:

Both EPA and DHS plan to cost recover. EPA has a list of approximately 800 potential responsible parties who utilized the LB&D recycling plant. EPA is in the process of refining and prioritizing this list and plans to contact companies, in a phased approach. There is very little information on barrel contents on the tags.

8. Comment:

One community member asked why the "no-action" alternative cost $170,000.

EPA Response:

The no-action alternative requires continuing monitoring of plume migration. The cost is associated with the installation of several monitoring wells, and periodic sampling and analytical work related to long-term monitoring requirements.

9. Comment:

One community member said he feared that test wells and borings could potentially contribute to the spread of aquifer contamination. [18]

EPA Response:

Properly designed and constructed wells will not cause cross-aquifer contamination. When a well is constructed, a casing is placed outside the well pipe. After the well pipe is installed, the space between the well pipe and the casing is filled with grout. The casing is then removed. The well is screened (i.e., where the water flows into the well) only 10 to 20 feet in one of the aquifers. With a properly constructed and installed well, no cross-contamination occurs.

10. Comment:

One community member, asserting that neighboring businesses use chemicals similar to those found at the LB&D site, asked why the LB&D property has been targeted for cleanup over other areas in the City. He recommended that EPA simply pave over the site as a parking lot, with a gravel base and a top layer of concrete. [19]

EPA Response:

Lorentz Barrel & Drum was targeted for cleanup because of noncompliance with hazardous waste management regulations. There are several Superfund sites in the South Bay, as well as sites under state orders requiring cleanup actions. If additional information is gathered indicating other sources of potential chemical contamination in areas near the Lorentz site, those sources will be investigated. Investigations of this sort may result in a site being added to the federal or state Superfund list. Paving over the Lorentz site will not result in cleaning up the groundwater contamination plume which has migrated offsite. The potential threat that exists to public health and the environment would not be alleviated by this alternative.

11. Comment:

One community member questioned why spent carbon solids could not be incinerated at a location on the LB&D site rather than at an incineration facility in Texas.[20]

EPA Response:

It would be very difficult and expensive to obtain a licensed mobile hazardous waste incinerator to come to the site to incinerate such a small amount of GAC. Mobilization costs are a major component of overall mobile incineration costs. On a per-ton basis, the resulting costs would be prohibitive.

12. Comment:

That same commenter, referring to the proposed treatment alternatives, asked that EPA consider more closely: the pollution caused by natural gas during incineration; the number of British thermal units (Btu) per hour dispersed into the air following incineration; Bay Area standards set for pollution in the air; and the possibility of simply using evaporation treatment on the water. [22]

EPA Response:

From AP-42 (an EPA compilation of air pollutant emission factors), the following pollutant emissions can be expected from a natural gas incinerator.

	Emissions in $lb/10^6$ cu ft	Emissions in $lb/10^6$ Btu
Particulate	1 to 5	0.001 to 0.005
Sulfur dioxide	0.6	0.0006
Nitrogen oxides	100 to 140	0.1 to 0.14
Carbon monoxide	20 to 40	0.02 to 0.04
VOCs - methane	2.7 to 3	0.0027 to 0.003
- nonmethane	2.8 to 5.3	0.0028 to 0.0053

At a rate of 32,000 Btu/min, or 1.92 x 10^{-6} Btu/hr, the AP-42 estimated emissions from the burning of natural gas are:

	Estimated Emissions in lb/hr
Particulate	0.0019 to 0.0096
Sulfur dioxide	0.0012
Nitrogen oxides	0.192 to 0.269
Carbon monoxide	0.038 to 0.077
VOCs - methane	0.0052 to 0.0058
- nonmethane	0.0054 to 0.0102

- All of the energy consumed in the incinerator would be released to the atmosphere, either through the flue gas or radiant heat loss from the incinerator and its peripherals.
- Bay area standards for carcinogenic emissions are addressed in the risk assessment (Section 6.0 of the Decision Summary). None of the pollutant emissions listed in the table would exceed the BAAQMD limit of 15 lb/day.
- The use of evaporation for treated groundwater is addressed in the answer to question 1 in this section.
- Results of treatability studies have shown that the incinerator should not be necessary.

13. Comment:

One community member said that the "No action" alternative should be considered more seriously as being in the public's best interest at this time. [22a]

EPA Response:

The "no action" alternative was not selected for this ERA because it would do nothing to alleviate threat that the shallow groundwater poses to the deeper drinking water aquifer. The "no action" alternative will be considered during the RI/FS.

14. Comment:

One representative of a community organization wanted to know the nature of the emissions coming out of the old incinerator that operated on the site. He also wanted to know the composition of the ash that is still on the ground. Finally, he wanted to know if

EPA is going to take shallow soil samples downwind of the site to determine if there is any metals contamination. [23]

EPA Response:

Based on current knowledge, EPA does not know what the emissions from the onsite incinerator were. EPA has already sampled ash from the incinerator. The samples contained minimal organic contaminants, at concentrations far below EPA's cleanup limits. However, the samples contained high concentrations of lead and zinc. As part of the RI, additional samples of the ash will be taken and analyzed to determine its composition. Shallow soil samples will also be taken around the incinerator's location and analyzed to determine if there is metals contamination present. If the results of these analyses are positive, additional samples will be taken (concentrically from the source) in order to assure that the area of contamination is fully defined. A detailed description of planned RI sampling activities is contained in the RI Field Sampling and Analysis Plan (FSAP), which was published in June 1988.

15. Comment:

One community member, referring to the Fort Detrick, Maryland studies on the epidemiological effects of airborne bacteria, asked what contaminants might be released from an onsite air stripper. [24]

EPA Response:

The contaminated groundwater at the site is not expected to contain any harmful bacteria. This, in conjunction with adequate equipment maintenance, suggests that release of airborne bacteria from an air stripper operation would be very unprobable if this alternative had been chosen. As pointed out in Sections 9 and 10 of the ROD, however, this alternative was not selected by EPA following treatability studies.

16. Comment:

That same commenter, referring to the ozone-ultraviolet (ozone-UV) and GAC treatment alternative, suggested that "reactive ion etching" would be a more effective treatment technology because this technology utilizes more radicals and, therefore, has a faster reaction time and is not dependent on an ultraviolet light source. This commenter also questioned how the natural gas and electrical facilities would be impacted if the ozone/UV treatment alternative were chosen. Specifically, he expressed concern about potential power shortages affecting the local community and industries. [25]

EPA Response:

EPA is not familiar with the term "reactive ion etching." The commentor is possibly referring to ozone-peroxide oxidation, which uses free radicals to decompose organic compounds. EPA has investigated ozone-UV treatment, which is known to be more effective than ozone-peroxide treatment. The treatability studies will determine whether ozone-UV is the best technology. If it is, the vendor of the treatment system will be responsible for generating the ozone on site.

Remedial activities will not use enough natural gas or electric energy to have any adverse affects on service to the community.

17. Comment:

One commenter, referring to EPA's plan to conduct well surveys, suggested instead that the site be isolated from the existing aquifers using a dolomite pump to isolate the clay soil from the sandy soil -- much like a slurry wall. [26]

EPA Response:

At the time the Engineering Evaluation and Cost Analysis (EE/CA) was finalized, there was not enough information available to determine whether or not slurry walls, or any other containment technology, would be effective. As a result, containment was not considered viable for the ERA. Additionally, the Superfund Amendment and Reauthorization Act of 1986 (SARA) favors the implementation of remedies that permanently treat the contamination, as opposed to remedies that merely contain it. However, a significant amount of new information will be generated during the RI. That new information will allow containment technologies to be considered during the FS.

5.0 RESPONSES TO COMMENTS FROM SILICON VALLEY TOXICS COALITION LETTER OF JUNE 30, 1988

The Silicon Valley Toxics Coalition (SVTC) letter of June 30, 1988 is reproduced as Exhibit 1. The questions have been numbered and the responses in this section relate to those numbers.

1. As part of the Phase I Field Investigation of the Remedial Investigation (RI), a well survey will be performed. After these wells have been identified, an assessment will be made regarding whether they could serve as vertical conduits between the shallow and deeper aquifers. Appropriate action to prevent cross aquifer contamination will be taken. Section 4.1.3.5 of the Final Work Plan provides more details on this survey.

2. The concern of vertical cross contamination between aquifers is addressed in question 9 (pg III-4-4) of the previous section.

3. The Field Sampling and Analysis Plan (FSAP) for the RI, finalized in August of 1988, presents a detailed explanation of all sampling and analytical work that will be performed during the RI. Sample locations are shown on Figures 3-10 through 3-15 of the FSAP. The monitoring wells will include several locations similar to those proposed by the SVTC.

4. The groundwater extraction system is presented in Section 8.2.2 of the Decision Summary. As stated in that section, the conceptual design prepared for the Engineering Evaluation and Cost Analysis (EE/CA) was based on limited information. The final design will be based on information gathered during the field investigation of the RI, through October 1988. The final number of wells will be determined at that time.

5. Several points should be made in responding to this question. First, if the treated water was reinjected into the same aquifer (i.e., shallow aquifer) from which it was drawn, it would probably not be used as drinking water. (Potable water supply wells utilize the deep aquifer.) However, if water was reinjected at all, it would need to be of a quality which is in compliance with state and federal regulations. Bench-scale treatability studies performed in July/August, 1988 indicated that treated effluent can meet Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act, as well as DHS drinking water action levels. Further studies will be performed, however, to ensure attainment of these levels. Specifically, an onsite pilot-scale demonstration of

the treatment alternative recommended in the ROD is being planned by EPA Region IX in conjunction with EPA's Superfund Innovative Technologies Evaluation (SITE) program. Results will confirm whether the treatment technology can attain stipulated water quality standards.

6. As stated in the answer to question 5 (pg III-4-3) in the previous section, the available information indicates that reinjection of the treated effluent would be less reliable and more expensive than discharge to the storm sewer and Coyote Creek. The effluent will be treated to below all regulatory limits. Each of the treatment alternatives investigated in the EE/CA incorporate backup systems to ensure that no untreated water is accidently discharged to the creek.

7. As stated above, reinjection will be considered in the RI/FS. The SVTC's "Percolation Ditch Plan" will be considered as one of the reinjection options.

EXHIBIT 1

Silicon
Valley
Toxics
Coalition

760 North First Street,
Second Floor
San Jose, California 95112
(408) 287-6707

Ted Smith
Executive Director

OFFICERS

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Santa Clara County Central Labor Council, AFL-CIO

Mike Belliveau, *Vice President*
Citizens for a Better Environment

Lil Ruscigno, *Secretary*
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Don Litz
Carpenters Local 316

P[illegible] Marchant
[illegible]res Foundation

Jesus Orosco
TIU/IFPTE

Frank Schiavo
Environmental Studies, San Jose State University

30 June 1988

Mary Masters
Remedial Project Manager
U.S. Environmental Protection Agency
215 Fremont Street (T-4-5)
San Francisco, CA 94105

Dear Mary,

I would first like to express my appreciation for the chance to comment on the cleanup processes of the Lorentz Barrel and Drum Superfund site. Releasing a report and offering a public comment period, and then having a community meeting, is a very positive move.

Given the opportunity to comment on the cleanup alternatives of the site, I am aware that there are more tests to be made and new results found. In this letter of comment, I will list concerns and questions, and give a suggestion for the placement of treated water.

I. Concerning wells drilled and the effects on the shallow and deep aquifers:

-- I suggest that the abandoned wells be sealed to prevent seepage to the lower aquifer.

-- In monitoring the lower aquifer, precautions should be taken to prevent vertical seepage.

-- Would monitoring wells drilled into the deep aquifer around the perimeter of the defined plume area help to identify deep groundwater contamination? (see illustration)

-- Would the planned 80 wells drilled for the pumping of contaminants be enough, or are more pumping wells needed to catch water flowing in the obvious direction of plume movement?

-- If treated water were to be recharged into the same aquifer, would it be safe to drink?

Comments:

I think it is necessary to keep the treated water as close to the site as possible and not have possible contamination in other areas of the valley. The alternative to placing treated water into Coyote Creek seems to be a means of giving the water to people downstream.

Attached is an idea I hope can be useful in the cleanup procedure.

II. Percolation ditch plan

Treating the pollution as close to the site as possible after pumping the water out, and then letting it percolate back into the ground, will hopefully flush the contaminants out of the soil.

The positive aspects of this plan are that the water is recycled and kept near the site.

Drilling monitoring wells beyond the pumping wells will aid in keeping track of any escaping contaminants into the deep aquifter.

The percolation ditch is "V" shaped and perforated for strength and faster percolation, respectively.

Thanks for your consideration.

Sincerely,

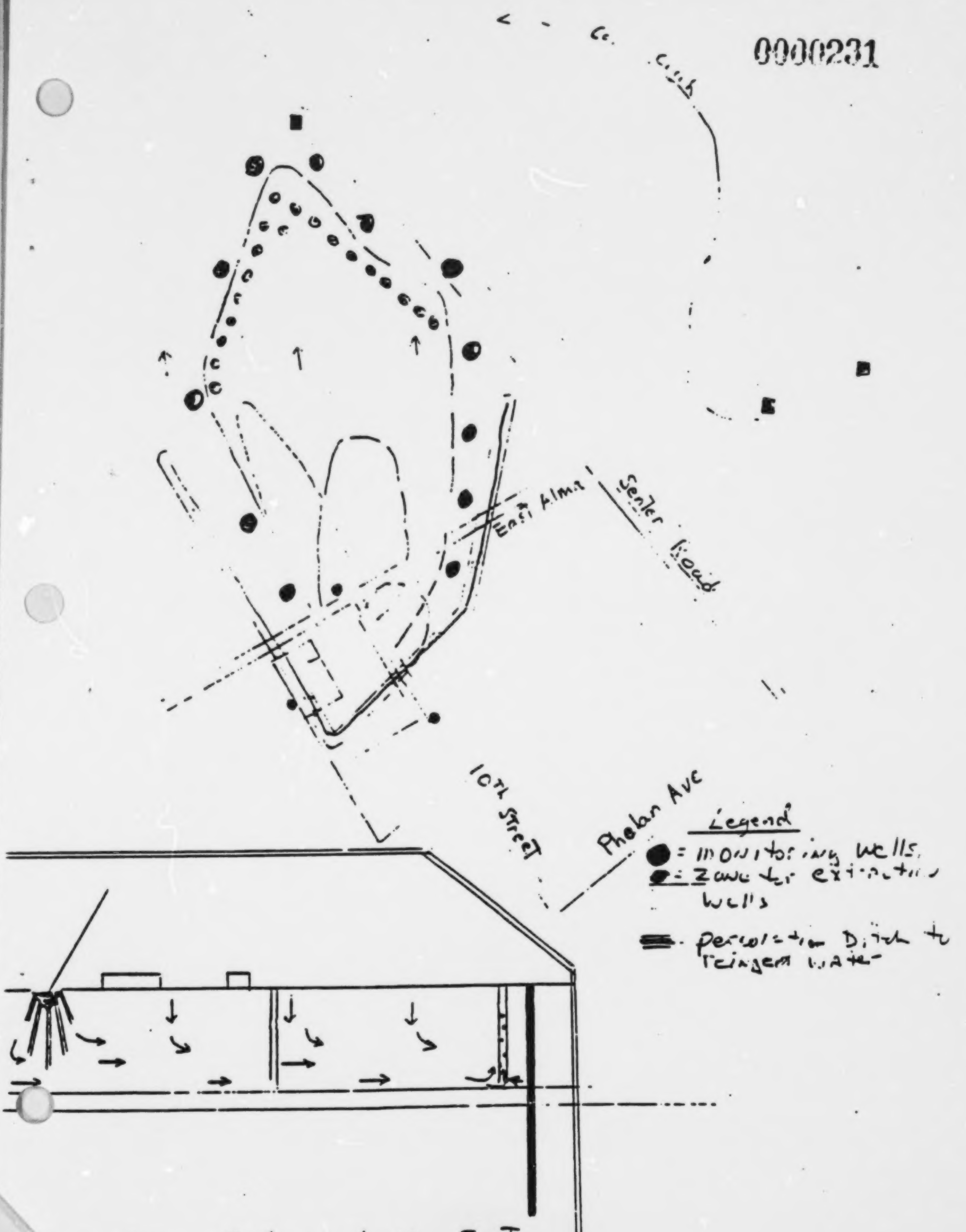
Bruce Beale

Bruce Beale

Ted Smith

Ted Smith

BB:np
Enc.


East Alma
Senter Road
10th Street
Phelan Ave
Legend
● = monitoring wells.
● = Zone for extraction wells
═ . percolation Ditch to reingem water

Cross Section - Looking East

6.0 RESPONSES TO COMMENTS FROM REED CORPORATION LETTER OF JUNE 30, 1988

The Reed Corporation letter of June 30, 1988 is reproduced as Exhibit 2. The questions are numbered, and the responses in this section refer to those numbers.

1. The shallow aquifer is not in use as a drinking water (or bathing) source at the current time. However, the Superfund Public Health Evaluation Manual, which provides guidance in assessing risks, requires the United States Environmental Protection Agency (EPA) to consider the ingestion, dermal, and inhalation pathways anyway. It is possible that some development may occur in the future, and this development could expose the public to risks from contaminated groundwater through the stated pathways.

2. The desired cleanup level for arsenic for use during the Expedited Response Action (ERA) is 0.23 parts per billion (ppb) (230 parts per trillion (ppt)) (see Table 8-2 of the Decision Summary). This represents an estimated cancer risk of 10^{-4}. Since the treated groundwater will be discharged to a surface water body during the ERA, the cleanup requirements were derived by comparing National Pollution Discharge Elimination System (NPDES) limits with the 10^{-4} cancer risk level. The more stringent level was then selected.

3. The levels reported on in Table 2-3 of the Engineering Evaluation and Cost Analysis (EE/CA) (Table 5-3 of the Decision Summary) are merely summaries of older data published by other contractors. In the case of barium, Table 8-2 of the Decision Summary shows that there is no desired cleanup level.

4. Please see the response to question 1 in this section.

5. 6.4 ppb represents the total of all types of polychlorinated biphenyls (PCBs) (1221, 1242, etc.) from well MW-4B in Table 2-3 of the EE/CA (Table 5-3 of the Decision Summary). While it is true that several of the more highly chlorinated PCB compounds have solubilities less than 6.4 ppb, the Handbook of Environmental Data on Organic Chemicals (2nd Edition, Van Nostrand Reinhold Company, New York, 1983) provides the following solubilities for the specific PCB compounds found at the Lorentz Barrel & Drum (LB&D) site:

Compound	Solubility at 24°C (ppb)
PCB 1221	590
PCB 1242	100
PCB 1254	57
PCB 1260	80

6. Superfund contractors are required in many cases by EPA to use certain methods to monitor quality control (QC) available only at EPA specified contract labs. In determining groundwater quality to identify contaminant plumes, for example, EPA would not allow the use of 2 to 3-year-old data taken by private contractors and analyzed outside the contract lab program. The statement in the EE/CA does not indicate that the work was poorly done; it merely indicates that it can only be used to a certain extent (i.e., to show the presence of contamination) and that more monitoring is required.

7. The purpose of the EE/CA is to establish the need for the ERA. It did not include a detailed investigation into the presence of upgradient sources. Such an investigation will be part of the Remedial Investigation (RI).

8. The purpose of the order of magnitude cost estimates was to assess feasibility only. The estimates incorporated the assumptions stated in the EE/CA. The RI will define the location of the plume in more detail.

9. The concern is based on the current level of information about the aquitard. The writer seems to agree in the second paragraph of his letter, that "the relationship between the upper and lower aquifer is not well known." Since this is the case, EPA did not want to risk the lower aquifer because of a lack of information.

10. According to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendment and Reauthorization Act of 1986 (SARA), the source of the vinyl chloride in the groundwater is only important as it relates to the potential to cleanup a source area and the potential for the government to recover cost from a potentially responsible party. If the groundwater is contaminated, it must be addressed. The RI field program will locate whatever sources remain on site. With regard to the other comment on health risks, please see the answer to question 1 of this section.

11. The risk levels shown on Table 5-1 of the EE/CA are based on a preliminary risk assessment. A more detailed and complete risk assessment will be prepared as part of the RI/Feasibility Study (FS). Also, see the answer to question 1 of this section.

12. Please see the discussion in Section 8.2.2 of the Decision Summary. A significant amount of additional work will be performed before the groundwater extraction system is finally designed. Please see the answer to question 5 in Section 4.0 of this Responsiveness Summary for a discussion of groundwater reinjection. As stated in the EE/CA, these costs are based on Ebasco Services, Incorporated experience and related RI/FS work in the region.

13. Please see the discussion in Section 5.4.3 of the EE/CA which shows that Bay Area Air Quality Management District (BAAQMD) requirements lead to the conclusion that the fume incinerator is necessary. As stated on page 5-24 of the EE/CA (May, 1988), a granular activated carbon (GAC) system for the off gas was not selected because of some concern that it might not be effective in absorbing vinyl chloride. However, as a result of treatability studies undertaken in July/August 1988, the capability of a vapor phase GAC to cost-effectively remove vinyl chloride has been established. In view of this finding, fume incineration is no longer considered to be a necessary component of the vapor control system.

14. The LB&D site has been proposed for inclusion on the National Priorities List (NPL). The question of the relative risk of LB&D as compared with other Silicon Valley sites was addressed when the site was proposed in 1984.

EXHIBIT 2

REED CORPORATION
Environmental Engineering

2140 Shattuck Avenue, Suite 504
Berkeley, CA 94704
(415) 524-0450
Mobile (415) 860-1125
Telecopy (415) 232-3796

June 30,1988

U.S.E.P.A.
215 Fremont Street (t-1-3)
San Francisco, CA 94105

CONFIRMING COPY
ORIGINAL SENT BY
TELECOPY ON 6/30/88

ATTN: Ms. Gail Louis
Community Relations Coordinator

Subject: Comments on the EE/CA for the Lorentz Superfund Site

Dear Ms. Louis:

The following comments have been developed based on my review of the REM III Program Final Engineering Evaluation and Cost Analysis for a Shallow Ground Water Collection and Treatment System Lorentz Barrel and Drum Site San Jose, CA dated May 1988 and prepared by EBASCO. For your information, I was the most recent environmental consultant for the Lorentz Barrel and Drum Company. Besides being very familiar with the area and the site, my qualifications for preparation of these comments, includes the management and review of over two dozen similar ground water and soil clean-ups at Superfund sites in California and other areas of the United States. I have organized my comments in the same order as the report.

P. 2-6 2.3.1 Regional Hydrogeology of the Santa Clara Valley
P.2-8 2.3.2 Site-Specific Hydrogeology

As shown on Figure 2-3, the 500 foot deep wells clearly show that there is an 60 feet thick (and likely impermeable) clay layer below the site, which should retard ground water movement and contaminant transport. Additionally as shown on Figure 2-3 and as noted on p. 2-12 there does not appear to be ground water below this clay layer. Also on p. 2-12 it is indicated that the relationship between the upper and lower aquifer is not well defined at this time.

p. 2-14 2.4.1 Contaminants of Concern

① The generalized description of the potential volatile organic contaminants indicates that the ...potential exposure pathways consist of ingestion, dermal contact, and inhalation of vapors from contaminated ground water...; however, the hydrogeology indicates that the aquifer of concern is likely perched and is not in use as a drinking water (and likely would not come into use due to high total dissolved solids), and these pathways do not appear to be realistic concerns with respect to public health.

Specific concerns of regarding other contaminants are as follows:

- Arsenic - while the Department of Health Service (DOHS) has an action level of 2.0 parts per trillion in the California Administrative Code Title 22 drinking water standards (64435 Table 2) show that the maximum contaminant level (MCL) is 0.05 ppm or 50,000 parts per trillion. The MCL would appear to be a more realistic goal for discharge to non-potable water such as would occur in the Lorentz matter. ②

- Barium - The reported levels of 160 ppb of barium from the CH2MHill reports appear to be above the solubility of barium in this ground water. Equilibrium would be approximately 100 ppb or less in the presence of sulfates. Additionally, the Title 22 standard for barium is 1000 ppb, which would appear to be a more realistic human health concern level. ③

- Vinyl Chloride - The EBASCO report states that the MCL for Vinyl Chloride is 1 ppb; USEPA MCL is 2 ppb effective 12/31/88. In any case the concerns over actual health hazards from the reported levels of vinyl chloride appear to be overstated due to the fact that the ground water is not used for drinking and the highly volatile nature of vinyl chloride which would cause it to be readily out-gassed during any normal usage of the water. ④

- PCB - The level of 6.4 ppb of PCB does not appear in Table 2-3 of the EBASCO report. The highest level shown is 4.0 ppb. These results appear to be higher than would normally be anticipated for PCB solubility in water. ⑤

p. 2-24 2.4.2 Analytical Data Review

Monitoring Well Analyses

I take strong exception to the statements that "The quality of the ground water analyses from investigations prior to the CH2M HIll study is poorly known, because sampling activities were minimally documented. Original lab reports for the work done by Associated Laboratories and Brown and Caldwell are not available at this time, and the results were transcribed from handwritten notes and faded photocopies." I personally transmitted via facsimile copies of information requested by Ms. Robin Scott of EBASCO in January 1988. At that time I informed her that copies of all lab data sheets were available at the DOHS or RWQCB files, and that I assumed that she had ready access to this information. I never heard back from Ms. Scott, and therefore assumed that she got what she wanted. Additionally, all appropriate documentation of sampling was submitted to the RWQCB and all information was available from the files of the Lorentz consultants with minimal additional effort from EBASCO. ⑥

p. 2-27 2.4.3 Extent of Shallow Aquifer Ground Water Contamination

Reference is made to Figures 2-6a and 2-6e show contamination VOC starting substantially to the south of the Lorentz site near the area of the bus (private) maintenance facility (see Figures 2-6d and 2-6e specifically). No mention of upgradient contamination is made, why is that and to what source is this likely due to? ⑦

p. 2-33 2.4.4 Contaminant Extent Data Gaps

It is indicated that the extent of the plume must be determined before a final treatment system design can be completed. How can a meaningful cost estimate be developed without knowledge of the extent of the plume? How does one assume the length of the plume (i.e. the distance of pipelines to return to the site) or the number of wells without this information, and why hasn't this information been determined in the work completed over the last two years by DOHS and EPA? ⑧

p. 2-33 2.5.2 Potential Impacts

The premise that the contaminated plume will reach potable drinking water is weak and quite implausible given the local hydrogeological conditions. To assume that there is sufficient VOC material present in the ground water where the highest concentration of total VOCs is less that 4 ppm (MW-4 TMA 7/86) is frankly ludicrous. There are dozens of sites in the Silicon Valley where 50 times this levels of VOC materials are present in the ground water. Additionally, in the 40 years of Lorentz operation there has never been any indication of any potential or actual deep aquifer contamination. ⑨

p. 5-3 5.2 Alternative A: No Action (Periodic Ground Water Monitoring)

Reference is made to Table 5-1 regarding relative risk, however, closer review of Table 5-1 would indicate that essentially all of the risk is related to Vinyl Chloride which most likely being produced naturally by biological processes in the soil from materials released to the ground water by someone in the area. Vinyl Chloride accounts for 7.24*10-2 of 7.83*10-2 (or 92 percent of the estimated risk). Clearly, this conditions dramatically overstates the relative health risk of the non-potable ground water in this area. ⑩

I strongly disagree with the assumptions made in this section. First, no single sample was utilized for this comparison. It appears to make little sense to add up the highest data from unrelated samples (spatial and time variations in all samples).

Second, the assumption that the very deep drinking water would be contaminated to the same degree as the shallow aquifer is silly. Clearly, by simple dispersion dilution of the water would occur and substantial adsorption of these materials would occur during the vertical movement of these materials in the unsaturated zone between the shallow and deep aquifer. ⑪

Third, because the water has nearly 2000 ppm of TDS it is not logical that one would ever drink any of this shallow ground water or that anyone would ever drink the estimate 51,100 liters per life time used in this estimate (nearly 14,000 gallons).

Fourth, no existing public health risks have been identified or a pathway quantified even though a comment is made to this effect in the text.

p. 5-5 5.3 Alternative B: Ground Water Removal; GAC Treatment
Disposal to Storm Sewer

It is indicated that no pumping tests have been completed and that this would be required prior to final design. Why hasn't this been done to date? Our analysis indicates that 50 gpm or so is likely to be the maximum flow available from the site with a reasonable number of wells (less than 10). How was the number of 80 wells derived without the pump test data?

It does not appear that the data support the requirement for the 80 wells shown on Figure 5-1 nor does hydrogeological or chemical data support the relative spacing of the wells with the exception of the approximate location of the plume in the northerly direction (recall that EBASCO previously stated that the extent of the plume was unknown). It is very unlikely that the wells will produce anything near to the five gpm assumed.

On p. 4-9 the concept of ground water reinjection was discarded; however, closer review may indeed indicate that this is the only effective alternative from the hydrogeolgical standpoint. ⑫

Several costs in Table 5-3 appear to be quite high. The cost of well installation per foot is approximately $125 (based on summing $55,500+126,000+107,000+163,000 and dividing by 80*45 feet = 3,600 feet). No well diameter information is given in the report. Assuming that four inch wells were constructed a cost of one half of this amount would be more typical.

Additionally, the cost of $252,000 for 80 wells results in a cost of over $3,000 for a pump and installation. My experience indicates that $2,000 is more typical. No cost is shown for electrical installation and no information is presented on the cost per foot of pipe trench.

The parameters for the design of the GAC units appear to be within standard ranges.